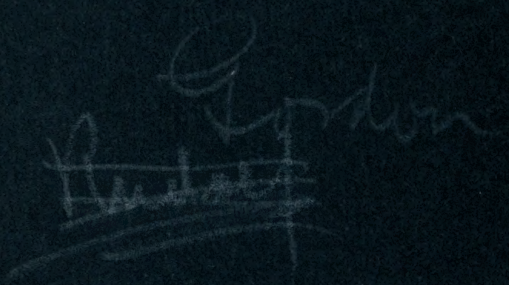

TRANSACTIONS

OF THE

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Vol. 13 1913

EDITOR

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Reynold Webb Wilcox	New York, N. Y.	1901-2
Thomas E. Satterthwaite	New York, N. Y.	1902-3
* Howard H. Barker	Washington, D. C.	1903-4
Oliver T. Osborne	New Haven, Conn.	1904-5
* Carl Beck	New York, N. Y.	1905-6
* Robert Reyburn	Washington, D. C.	1906-7
* John V. Shoemaker	Philadelphia, Pa.	1907-8
Frederic H. Gerrish	Portland, Me.	1908-9
James C. Wilson	Philadelphia, Pa.	1909-10
Harvey W. Wiley	Washington, D. C.	1910-11
Alexander D. Blackader	Montreal, Can.	1911-12
Noble P. Barnes	Washington, D. C.	1912-13

* Deceased.

DECEASED MEMBERS

Samuel Claggett Busey, M.D., LL.D., died Oct. 19, 1899.
William P. Manning, M.D., died Feb. 9, 1901.
John Thomas Winter, M.D., LL.D., died June 22, 1902.
George Edward Tyler, M.D., died July 7, 1902.
Robert Henderson Graham, M.D., died Aug. 24, 1903.
George Bingham Fowler, M.D., died March 6, 1907.
John S. McLain, M.D., died June 2, 1907.
Robert Reyburn, M.D., died March 25, 1909.
Justin Steer, M.D., died June 20, 1909.
Howard H. Barker, M.D., died May 8, 1910.
John Veitch Shoemaker, M.D., died October 11, 1910.
Carl Beck, M.D., died June 8, 1911.
Henry Alfred Robbins, M.D., died October 26, 1911.
John Herr Musser, M.D., died April 3, 1912.
Louis Nelson, A.M., M.D., died April 14, 1912.

CONSTITUTION AND BY-LAWS.

ARTICLE I.

This Society shall be known as the American Therapeutic Society.

ARTICLE II.

The object of this Society shall be the promotion of therapeutics in its broadest sense.

ARTICLE III.

This Society shall meet annually at such time and place as the Council may determine.

ARTICLE IV.

SECTION 1. The Officers of this Society shall consist of a President, three Vice-Presidents, a Secretary, a Treasurer, and a Council of fifteen members, all to be elected from the active membership, by ballot, at an annual meeting.

SECTION 2. The Council may be convened at any time by the Chairman, at the request of any three of its members. Its decisions shall be equivalent to acts o fthe Society, and shall be reported to it at the next regular meeting. The Council shall elect from its members a Committee on Admissions to consist of three members.

SECTION 3. A vacancy occurring in any office may be filled by the Council.

ARTICLE V.

SECTION 1. This Society shall consist of not more than one hundred active members. Honorary members may be elected on recommendation of the Council.

SECTION 2. Any qualified physician engaged in the general or special practice of medicine or surgery, or in laboratory research of interest in the treatment of disease, is eligible for membership.

SECTION 3. Applications for membership should be made in writing at least one month before the annual meeting. They are to be referred to the Committee on Admissions, which shall, on approval, present their names to the Society at the annual meeting. Five negative ballots shall reject an applicant.

SECTION 4. Applications for membership shall be accompanied by the annual dues for the ensuing year.

SECTION 5. Resignation of members shall not be accepted until all dues have been paid.

ARTICLE VI.

All proposed changes of the Constitution must be offered in writing at a regular meeting. They are to be considered only at an annual meeting, when a two-thirds vote of the members present shall be necessary for their adoption.

BY-LAWS.

1.

The *President* shall preside at the annual meeting of the Society, and deliver an address. He shall appoint a Committee on Scientific Business and a Committee of Arrangements.

In the absence of the President, one of the Vice-Presidents shall preside.

2.

The *Secretary* shall keep a record of the transactions of the Society and of its Committees, conduct all correspondence of the Society, and mail to each member a programme of the meeting, at least two weeks before it is held. The records, publications and seal of the Society shall be in his custody.

The *Treasurer* shall collect all moneys due the Society, disburse the same, as directed by the Council, keep a proper account of all his transactions, and render an annual statement to the Society. He shall have charge of all property belonging to the Society not otherwise provided for.

3.

Ten active members shall constitute a quorum for the transaction of business.

4.

SECTION 1. The *Council* shall constitute a standing committee to consider all matters of interest to the Society. It shall elect a Chairman, Vice-Chairman and a Secretary, and shall appoint an Editor of the Transactions.

SECTION 2. Three members of the *Council* shall be elected annually by the Society, each to serve five years.

SECTION 3. Five members shall constitute a quorum.

5.

The *Committee on Admissions* shall investigate the qualifications of applicants and report at the next annual meeting.

6.

Charges against any member must be made in writing. They shall be referred to the *Council* for investigation.

7.

No papers, report, abstract or other communication, either written or verbal, which, directly or indirectly, commends or advocates any secret, patented or trade-marked product or method of treatment shall be presented to or received by the Society; nor shall any discussion on such product or method be permitted.

Papers are limited to twenty minutes and discussions to five minutes.

8.

The *annual dues* shall be five dollars, payable in advance.

9.

The *order of business meetings* shall be as follows:

1. Reading of Minutes.
2. Reports of Officers and Committees.
3. Election of Members.
4. Presentation of Communications.
5. Miscellaneous Business.
6. Election of Officers.

PAPERS READ BEFORE THE SOCIETY.*

ANDERS, J. M.—What Constitutes a Useful Drug, and Shall the Preparations of a Useful Drug be Limited to One or Two? Read by title (1910). (*Monthly Cyclopedia and Medical Bulletin*, Feb., 1911.) Obituary of Dr. J. V. Shoemaker (1911). Dioxydiamidoarsenobenzol in the Treatment of Various Clinical Forms of Syphilis. (*Monthly Cyclopedia and Medical Bulletin*, July, 1912.)

ANDERSON, H. B.—The Medical Treatment of Cholelithiasis. (*Monthly Cyclopedia and Medical Bulletin*, Nov., 1913.)

BABCOCK, W. W.—The Range of Activity and the Untoward Effects of Certain Spinal Analgesics; Based on Two Thousand Administrations (1910). Uses and Limitations of General Anesthesia as Produced by Subcutaneous and Intravascular Injections. (*Monthly Cyclopedia and Medical Bulletin*, Jan., 1912.) The Treatment of Somatic Death. (*Monthly Cyclopedia and Medical Bulletin*, Dec., 1912.) The Dangers and Disadvantages of Spinal Anesthesia. (*New York Medical Journal*, Nov. 8, 1913.)

BARNES, N. P.—Bacterins: their Present Status in Therapeutics (1910). Filariasis: Report of Case Treated with Dioxydiamidoarsenobenzol. (*Monthly Cyclopedia and Medical Bulletin*, Jan., 1913.) Presidential Address, 1913. (*Monthly Cyclopedia and Medical Bulletin*, Oct., 1913.)

BARTON, W. M.—Hexamethylenamine in the Treatment of Otitis Media (1910). Copper Chemotherapy, With Especial Reference to the Double Tartrate of Copper Oxide and Sodium. (*Monthly Cyclopedia and Medical Bulletin*, Nov. and Dec., 1913.)

BEATES, JR., H.—Some Fundamental Principles in Digitalis Therapy. Read by title. (*Monthly Cyclopedia and Medical Bulletin*, Sept., 1912.)

BECK, C.—On Morbus Basedowi. Read by title (1910).

BEEBE, S. P.—The Preparation of Thyroid Gland for Use (1910).

BISHOP, L. F.—The Treatment of Arteriosclerosis. (*Monthly Cyclopedia and Medical Bulletin*, Aug., 1913.)

BLACKADER, A. D.—Presidential Address, 1912. (*Monthly Cyclopedia and Medical Bulletin*, Aug., 1912.)

BLAKE, C. J.—Obituary of Dr. Louis Nelson (1912).

BOOS, W. F.—The Newer Heart Remedies (1911).

BROWN, P. K.—A Modified Vaccine Therapy in Pneumonia; with Animal Experiments (1911).

COHEN, S. S.—What Unofficial Drugs are of Sufficient Clinical Value to be Recognized in the United States Pharmacopeia of 1910? Read by title (1910). Recent Improvements in the Quinine Treatment of Lobar and Lobular Pneumonia. (*Journal of the American Medical Association*, July 12, 1913.)

CROFTAN, A. C.—The Nature of the Cardiovascular Changes in Nephritis. (*Monthly Cyclopedia and Medical Bulletin*, Sept., 1912.)

CROTHERS, T. D.—The Delusion of the Stimulant and Tonic Effects of Alcohol. (*Monthly Cyclopedia and Medical Bulletin*, July, 1911.)

DA COSTA, J. C., JR.—The Routine Use of the Autogenous Vaccines (Bacterins) in the German Hospital, Philadelphia (1910).

DAVIS, N. S., JR.—Should the Pharmacopœia Contain Only Useful and Efficient Drugs? (*Monthly Cyclopedia and Medical Bulletin*, Feb., 1911.)

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* For list of papers read before the Society from its organization to the year 1909, inclusive, see the *Transactions* for 1909.

DAWES, S. L.—The General Treatment of High Blood-pressure. (*Monthly Cyclopedia and Medical Bulletin,* Dec., 1912.)

EVANS, D. J.—High Blood-pressure in the Toxemias of Pregnancy. (*Monthly Cyclopedia and Medical Bulletin,* Nov., 1912.) Climatic Conditions in California and Their Influence in the Treat ment of Tuberculosis. (*Monthly Cyclopedia and Medical Bulletin,* Sept., 1913.)

FISHER, E. D.—Senile Epilepsy. (*Monthly Cyclopedia and Medical Bulletin,* September, 1910.) General Paresis, Tabes, and Cerebrospinal Syphilis. Read by title. (*Monthly Cyclopedia and Medical Bulletin,* 1912.) High Blood-pressure Arising from Nervous Strain in Diseases of the Nervous System. (*Monthly Cyclopedia and Medical Bulletin,* Oct., 1912.) Dioxydiamidoarsenobenzene-monomethane Sodium Sulphonate in Syphilis of the Nervous System (1913).

FLICK, L. F.—Skin Inunctions as a Therapeutic Measure. Read by title. (*Monthly Cyclopedia and Medical Bulletin,* Aug., 1910.)

FREEMAN, E. B.—Treatment of Splanchnoptosis, With Report of Cases (1913).

FRIEDENWALD, J.—The Effect of Scarlet Red in the Treatment of Ulcer of the Stomach and Duodenum. (*Monthly Cyclopedia and Medical Bulletin,* June, 1913.)

FUSSELL, M. H.—Further Consideration of the United States Pharmacopœia. Read by title. (*Monthly Cyclopedia and Medical Bulletin,* March, 1911.) Obituary of Dr. John H. Musser (1912).

GALLANT, A. E.—The Delayed Menopause: its Dangers and Therapeutic Indications. (*New York Medical Journal,* June 18, 1910.) Panhysterocolpectomy for Hernia Vaginæ. (*Monthly Cyclopedia and Medical Bulletin,* Dec., 1911.) The Therapeutics of Sacroiliac Relaxation as a Sequel to Surgical Operations. (*Monthly Cyclopedia and Medical Bulletin,* Feb., 1913.) Prolonged-precipitate Parturition Due to Disengagement of the Disproportionate Head. (*Medical Record,* Aug. 23, 1913.)

GOMPERTZ, L. M.—Medical Treatment of Gastric and Duodenal Ulcer. (*Monthly Cyclopedia and Medical Bulletin,* March, 1913.)

GORDINIER, H. C.—Chronic Acetanilide Poisoning a Perfectly Definite Symptom-complex. (*Monthly Cyclopedia and Medical Bulletin,* 1912.)

GREEN, C. L.—Asthenia Universalis Congenita. (*American Journal of the Medical Sciences,* 1910.)

HEMMETER, J. C.—Hyper- and Hypo- Tonicity of the Vagus and Sympathetic Nervous System—Neurochemic Synergism of the Normal Body and its Suggestions for Physiological Therapeutics. (*New York Medical Journal,* Jan. 17, 1914.)

HITCHENS, A. P.—A Discussion of Current Developments and Problems in Vaccine Therapy. (*Monthly Cyclopedia and Medical Bulletin,* Oct., 1913.)

HUGHES, C. H.—Obituary of Dr. Justin Steer (1911).

KEBLER, L. F.—The Present Status of Drug Addictions in the United States. (*Monthly Cyclopedia and Medical Bulletin,* Jan., 1911.)

KING, A.—Further Study of Diabetes as an Infectious Disease. (*Monthly Cyclopedia and Medical Bulletin,* July, 1910.) Diabetes Mellitus from a Surgical Standpoint. (*Monthly Cyclopedia and Medical Bulletin,* Aug., 1911.)

KOLIPINSKI, L.—Further Use of Solution of Calcium Creosote in Medicine. (*Monthly Cyclopedia and Medical Bulletin,* Aug., 1910; June, 1911.) On the Uses of Nickel Sulphate in Medicine. (*Monthly Cyclopedia and Medical Bulletin,* June, 1911.) The Proper Diabetic Treatment of Diabetes Mellitus. (*Monthly Cyclopedia and Medical Bulletin,* Aug. and Sept., 1912.) The Treatment of Pneumonias With Mercury and Sulphur Internally. (*Monthly Cyclopedia and Medical Bulletin,* July, 1913.)

LARRABEE, R. C.—The Treatment of Leukemia with the Mixed Toxins of Coley (1911).

LEECH, D. O.—Obituary of Dr. H. H. Barker (1911).

LONG, E. H.—The Metric System. Read by title. (*Monthly Cyclopedia and Medical Bulletin,* Mar., 1911.)

McPHEDRAN, A.—Treatment of Pneumonia. (*Monthly Cyclopedia and Medical Bulletin*, June, 1910.)

MORGAN, F. P.—Suggestions for the Pharmacopœia of 1910: A Brief Consideration of the Subject in its Relation to the Federal Food and Drugs Act. (*Monthly Cyclopedia and Medical Bulletin*, March, 1911.)

MORRIS, R. T.—Surgery of the Obese. Read by title. (*Monthly Cyclopedia and Medical Bulletin*, 1910.) Epithelial Conductors and Obstructors. (*Monthly Cyclopedia and Medical Bulletin*, Aug., 1911.) Newer Notes on the Subject of Peritoneal Adhesions. (*Monthly Cyclopedia and Medical Bulletin*, Sept., 1913.)

MORTON, W. G.—Note on Fluorescence Excited Within Human Tissues as a Method of Treatment. (*Monthly Cyclopedia and Medical Bulletin*, Nov., 1911.)

NAGLE, E. W.—Some Observations on Vaccine Therapy. (*Monthly Cyclopedia and Medical Bulletin*, June, 1911.)

OSBORNE, O. T.—U. S. P., 1910. How May It Be Constructed? (*Monthly Cyclopedia and Medical Bulletin*, Jan., 1911.) Common Types of Thyroid Hyposecretion. (*Journal of American Medical Association*, 1912.) The Absurdities and the Commercialism of the Proposed Ninth Decennial Revision of the United States Pharmacopeia. (*Journal of the American Medical Association*, 1913.)

PORTER, W. H.—Sodium Nitrite in Arterial Hypertension. (*Monthly Cyclopedia and Medical Bulletin*, Feb., 1913.)

POTTENGER, F. M.—Some of the Factors which Alter Blood-pressure in Pulmonary Tuberculosis. (*Monthly Cyclopedia and Medical Bulletin*, Oct., 1912.) What Does Treatment Offer to the Advanced Tuberculous Patient? (*Monthly Cyclopedia and Medical Bulletin*, Oct., 1913.)

REMINGTON, J. P.—Revision of the United States Pharmacopœia. (*Monthly Cyclopedia and Medical Bulletin*, Feb., 1911.)

ROSS, GEORGE G.—A Case of Recurrent Abscess Formation, Due to Staphylococcus Infection, Successfully Treated by Autogenous Vaccines. Read by title. (*Monthly Cyclopedia and Medical Bulletin*, September, 1910.)

ROUSSEL, A. E.—Pulmonary Syphilis, With Report of a Case Promptly Responding to Specific Treatment. (*New York Medical Journal*, Sept. 27, 1913.)

RUDOLF, R. D.—Effects of Medicinal Doses of Aconite upon the Pulse Rate. Read by title. (*American Journal of the Medical Sciences*, Dec., 1912.)

RUSSELL, F. F.—Antityphoid Inoculations (1913).

SAJOUS, C. E. DE M.—Acute Hypoadrenia as a Cause of Death, and its Treatment. (*Monthly Cyclopedia and Medical Bulletin*, Dec., 1911.) The Relation between High Blood-pressure and the Adrenals. (*Monthly Cyclopedia and Medical Bulletin*, April, 1913.)

SATTERTHWAITE, T. E.—High Frequency Currents in the Treatment of Arteriosclerosis. (*Medical Record*, July 2, 1910.) Malignant Endocarditis in New York City: A Clinical Study. (*Medical Record*, July 15, 1911.) Notes on the Differentiation of Cardiac Arrhythmias and their Treatment, with a New Time Marker. (*Monthly Cyclopedia and Medical Bulletin*, March, 1913.) A Case of Influenzal Meningitis in the Adult Complicated by Pneumonia—Recovery. (*New York Medical Journal*, May 24, 1913.)

SHOOK, F. N.—The Malarial Infections and Their Treatment in the Canal Zone. (*Monthly Cyclopedia and Medical Bulletin*, June, 1910.)

SHOUP, J.—Immediate and After Management of the Puerperant. (*Monthly Cyclopedia and Medical Bulletin*, October, 1910.)

SPRIGG, W. M.—Obituary of Dr. H. H. Barker (1911).

STEWART, F. E.—Some Points in Bacterial Therapy. (*Monthly Cyclopedia and Medical Bulletin*, October, 1910.) Dioxydiamidoarsenobenzol as a Patented Product. (*Monthly Cyclopedia and Medical Bulletin*, Sept. and Oct., 1911.) Modern Methods of Drug Standardization. (*Monthly Cyclopedia and Medical Bulletin*, Jan., Feb., and

March, 1913.) The Application of Some Muscular Tissue Adapted to Physiological Standardization. (*Monthly Cyclopedia and Medical Bulletin*, Sept., 1913.)

TAYLOR, J. M.—Some Principles in the Treatment of Chronic Nervous Diseases. Read by title (1910). Remarks on the Treatment of Chronic Disease. (*Monthly Cyclopedia and Medical Bulletin*, 1912.) Treatment of High Blood-pressure by Manual Methods, Regulated Movements, and Neutral Immersion Baths (1912). Orthotherapy: The Power Which Correct Position, Organic Adjustments, and Mobility Exert Upon Health and Recovery. (*Monthly Cyclopedia and Medical Bulletin*, Jan., 1914.)

TAYLOR, L. H.—The Value of Enterostomy in Ileus. (*Monthly Cyclopedia and Medical Bulletin*, July, 1912.)

VAN RENSSELAER, H.—The High-frequency Current in the Treatment of High Blood-pressure. (*Monthly Cyclopedia and Medical Bulletin*, Nov., 1912.)

WHITE, J. B.—Important Therapeutic Indications in the Treatment of Typhoid Fever (1910). Hypodermic Medication: Its Advantages and Technique (1911).

WILCOX, R. W.—The Treatment of Leukæmia by the Röntgen Ray. (*Monthly Cyclopedia and Medical Bulletin*, July, 1910.) Treatment of Chronic Universal Perihepatitis. (*Monthly Cyclopedia and Medical Bulletin*, July, 1911.) Note on the Treatment of Gastric Neuroses. (*Monthly Cyclopedia and Medical Bulletin*, Nov., 1912.) Obituary of Dr. Carl Beck (1912). The Treatment of Diabetes and Pregnancy. (*Monthly Cyclopedia and Medical Bulletin*, July, 1913.)

WILEY, H. W.—President's Address: Bromatotherapy. (*Monthly Cyclopedia and Medical Bulletin*, July, Sept., Oct., and Nov., 1911.)

WILLIAMS, T. A.—The Treatment of "Parasyphilis" of the Nervous System in the Light of Recent Research: Paresis and Tabes Dorsalis. (*Monthly Cyclopedia and Medical Bulletin*, Dec., 1910.) The Radical Removal of the Conditions Causing Arterial Changes Leading to Non-psychogenic Disturbances of the Nervous System. Read by title. (*Monthly Cyclopedia and Medical Bulletin*, Dec., 1911.)

WILSON, J. C.—President's Address: The Progress of Therapeutics. (*Monthly Cyclopedia and Medical Bulletin*, June, 1910.)

SCIENTIFIC PROCEEDINGS.*

FOURTEENTH ANNUAL MEETING,

Held at the Hotel Willard, Washington, D.C., May 5 and 6, 1913.

PRESIDENT'S ADDRESS.

By NOBLE P. BARNES, M.D.,

WASHINGTON, D. C.

Gentlemen of The American Therapeutic Society: It is perhaps superfluous for me to express my profound appreciation of the distinguished honor that has been conferred upon me by this Society, America's representative of advanced therapy. Seemingly it would be a grievous error if left to the unwritten understanding.

Realizing the exalted position does not impart alone a feeling of satisfaction, for the president of a national organization like this is all the more "a debtor to his profession" and is deeply sensible of the associated responsibilities. This occasion of supreme attempt is therefore approached with hesitancy, even timidity; when, reflecting for a moment, I recall the celebrities in whose shoes I am standing, if not filling, today: Wood, Wilcox, Satterthwaite, Barker, Osborne, Beck, Reyburn, Shoemaker, Gerrish, Wilson, Wiley, and Blackader.

My thirteen years as secretary to this Society have been a great schooling—an annual post-graduate course of new therapy six to twelve months in advance of the press. This and another selfish reason are my excuses for inflicting my services for so long a period.

There is a sense of delight in meeting and rubbing shoulders with and knowing great men, but there is a greater satisfaction in having them know you. A secretary is always known, possibly not always pleasantly, but he is known. This is my second excuse. Rewards today realized constitute a greater measure than my meagre efforts deserve, and must be regarded at

*It is to be understood that the Society does not hold itself responsible for any views expressed by the readers of papers or participants in discussions.

A list of the papers read before the Society during its first ten years, arranged under the names of their respective authors, will be found in the *Transactions* for 1909.

least in part an expression of respect for my colleagues, the local members, who have likewise contributed to the success of the Washington meetings of the Society.

To read the programs of the scientific sessions of The American Therapeutic Society is to review the advances in the practical and most important branch of medicine and surgery in a period of time that has outstripped the accumulation of all ages in scientific attainments; resulting not only in the greatest relief for the individual patient but in the fulfilment of a broader conception—the prevention of disease and the care of the public health.

Therapeutics of today is not an art but a collection of facts, scientific or empirical, and the latter are passing through the furnace of scientific proof. The instruments of precision and investigation that made histology, physiology, bacteriology, and pathology have now entered the field of therapeutics. These scientific studies have given us our chemotherapy, our serums, and our vaccines. The actions of these only a few years ago would have been considered miracles.

The entire scope of accurate therapy co-ordinates with scientific results that can be prognosticated. The old blind, unreasoning faith in the mysteriously wise physician is gone, and through thoughtful reasoning and accurate deductions we have passed into the spotlight of science with corresponding death-rate reduction, diminished infant mortality, and lengthened span of life. The remnants of fanciful theorizing and superstitious faith are nowadays seen only in cults and pathies born of ignorance and nourished by selfish imposition of the unscrupulous on the still ignorant.

Until recently, the general profession was several years in arrears of advanced medicine and the people several years behind the general profession. Notwithstanding the advances made it is yet an interesting fact that the professional ability of a predecessor can be accurately gauged by the family's knowledge and application of the principles of health and hygiene.

It is needless to remind you that a few decades ago there was little scientific therapy; that the organization of The American Therapeutic Society was for the purpose of giving life to the important excuse for our professional existence, the treatment and prevention of disease.

Need I remind you that our drug armamentarium was in a questionable condition; that our pharmacies were surfeited with proprietaries, and that so-called synthetics and new combinations were strangling all attempts at rational drug therapy?

Need I remind you that one of the first acts of this Society, May 2, 1900, was to present a plan to the Pharmaceutical Convention, then in session, relative to the formation of a bureau of materia medica investigation? This plan a month later was presented to the American Medical Association, and finally culminated in the establishing of a Council on Pharmacy and Chemistry which, in conjunction with the efforts of a similar department of the government, has accomplished inestimable good for both layman and physician.

Need I remind you that in order systematically to tabulate the progress

in therapy a method was first instituted in our New York meeting of 1902 to review the advances in the various branches? This suggestion was soon adopted by leading societies and journals all over the world. Live again for a moment that inaugural symposium with D. B. St. John Roosa, Wm. H. Carmalt, Chas. H. Knight, Eugene Fuller, Chas. G. Kerley, Ed. D. Fisher, Mathew D. Mann, Chas. Jewett, Newton M. Shaffer, Wm. J. Morton, and Chas. W. Allen.

Need I remind you that in another year we had taken up the important subject of the teaching of therapeutics and the equally important proposition of drug standardization? Still another year and we had a survey of progress in anesthesia that stands in advance to this day, and a study of the combat with infection presented by an equally strong array of talent.

Symposia on Diseases of the Vascular System, on the Treatment of Tuberculosis, on Roentgen Ray Therapy, on Diabetes, on Cholelithiasis, on Diet, on Psychotherapy, on Matters Pertaining to the Revision of the Pharmacopœia, and, lastly, on the Etiology and Treatment of High Blood-pressure, have been presented by men of advanced thought and authorities on their respective subjects.

Likewise every form of therapy, from chemical to mechanical, from physical to psychical, from curative to preventive, has been presented by a score of experts. Papers on metabolism, anaphylaxis, immunity, and every phase of advanced medicine and surgery have entered into the varied, interesting and instructive programs.

It was indeed a happy time for the birth of a therapeutic society that was to live in and to assist in the development of modern scientific medicine.

In this day of The American Therapeutic Society we have travelled from the discovery and understanding of many pathogenic bacteria, the etiological factors in many diseases, their means of invasion, their hosts, their life and habits and the measures to employ to prevent or neutralize their existence, to the benevolent organisms and their employment in combating disease and deferring old age.

We have come to realize that these lower forms of life, hitherto impenetrably shrouded, have, through their influences on man, actually ruled the universe from all time. Good or evil government, health or disease, strength or weakness, have depended entirely upon the opposing forces; the beneficent and malignant microbes constantly at war in the human body.

The triumph of health over disease is an understanding of these. We no longer wait for the deadly microbe to intrench and mass, but anticipatingly defend by immunizing. Thus have the scourges of small-pox, lockjaw, typhoid, diphtheria, and hydrophobia succumbed to science.

This modern conception of disease, its causes, and its prevention, has made health resorts out of previously diseased and death-ridden districts. It has enabled our armies to muster without having hundreds die of disease to every one killed in battle. It has permitted the completion of the greatest engineering feat of modern times. It has enabled Stiles and his co-workers to overcome the insidious worm of laziness. It recently enabled Surgeon-

general Blue and his force to prevent the spread of cholera and the bubonic plague. It enabled McLaughlin to understand the cause of infant mortality where mothers were living on foods lacking in nitrogenous elements. It has enabled the hygienic laboratory to prepare rabies antidote not only for cases that come here for treatment, but for those applying for treatment at the health departments in any part of the country. It has given pure water and pure milk to the community. It is hopefully wrestling with pellagra, cancer, and other diseases that have not yet surrendered.

Never in the history of mankind has there been a period of time so replete in activities for lessening disease and accident, preventing mental and physical suffering, and contributing to the happiness of the whole people.

This is truly the age of the gospel of health and hygiene. Results are already apparent. The health office report for 1912 announced the lowest death rate ever known in the District of Columbia. In two decades, death from typhoid has been reduced more than 66 per cent.; from tuberculosis, over 33 per cent. We now count on a span of life about ten years longer than the allotment of 1900.

It requires deliberate reflection to realize the changes in modern life that have resulted from recent scientific medical discoveries. The practical application of these has made it possible for masses of human beings to live in comfort and health where overcrowding was formerly penalized by death. The whole scheme of modern life is built around modern sanitation, the removal of which would cause our existing cities to shrivel with a promptness that would fade into insignificance the pestilences and plagues of the past.

While in harmony with all methods of public education that are conducted along rational lines, I cannot refrain from calling your attention to this swift-moving age with its thirst for individual aggrandizement and notoriety. The classic can now be changed to read:—

"Lives of great men all remind us"
We can make our lives eternal
Without departing, have beside us
Four-inch headlines in the journal.

In this day we have movements, founders, organizers, expounders, professional philosophers and general disturbers of the peace. We have a multiplicity of authority on education, social order (or disorder), moral (or immoral) hygiene, political economy, international diplomacy, cattle, cats and children. There are some real artists in this line who get money, it is claimed, for every word they write, and there seems to be no limit to the writing! Some is good, some bad, some dangerous.

The anxious mother who has a dyspeptic and unnatural child—or a normal one for that matter—must feel a sense of relief when she shifts the responsibility of the child's diet and living to the guidance of a literary expert who boldly states that the child may select his own diet and there shall be no argument about it, for "he wants what he wants when he wants it." This, "like the love of God, passeth all understanding."

In this education and re-education of mankind there is evidence of the general wave of hysteria that has spread over the world. Here are two men writing on the same subject: "Care of the Skin, etc." One is enthusiastic over soaps, listing a sufficient variety to arouse suspicion; the other decries their use, and belittles the mind still clinging to the delusion.

Here is another man, remotely removed from the New York subway, who believes that upon agitation of the air, no matter how confined, the currents will produce the desired degree of freshness.

Still another interesting suggestion, novel enough for notice, comes from a French educator, Dr. Léon Meunier. He claims that walking on all fours after a meal is the best means to expedite gastric evacuation. There will be opportunity for the members to confirm this statement during this meeting. To walk around the tables in this manner may appear unprofessional and undignified; but why object so long as the right education is being given to an organ that shows a rebellious spirit during occasions of this kind?

Then we have the mushroom sex educators, often perverts, with their "important messages to parents." If there was ever a day when a child needs our deepest consideration, that day is here. Such a bombardment of advice has never before been directed against the helpless innocent. Here is a book on "How to Train the Young," "What Should a Girl Know?" "What Should a Boy Know?" etc. Some of these books are good, some excusable, some devoid of sense and abounding in suggestion, some the products of spinsterhood, and some the expiring efforts of masculine senility. Pity the child who falls victim to these hysterical effusions.

The influence of the press on the evolution of the people is an important and serious matter. More attention should be given to the medical items, which are sometimes handled in a careless manner. The people have a right to receive accurate statements and the editors are anxious to supply the public demand. Misrepresentation may occur when an enthusiastic reporter desires to supply an interesting news item; but more often the error is the result of the effort of some self-appointed educator to air his name and address and frequently his cure.

The greater the interest in subjects pertaining to health and hygiene, the better for preventive therapeutics. Any means, therefore, of disseminating medical knowledge that is correct and proven, that eliminates the undesirable and the untrue, is proper. No vehicle can carry this burden better than the daily press.

A presidential address should contain at least one suggestion, even if it be but the "two grains of wheat hidden in two bushels of chaff." Therefore I ask your indulgence for a few minutes to discuss briefly a subject that has, I dare say, been in the minds of every thinking physician since his college days.

Hosts of students are so confused in their study of pharmacology, so drowned in the enormity of its proportions, so discouraged in the monotonous memorizing of the meaningless mass, that they fail to collect and retain the wheat and in due time become drug nihilists or thoughtless prescribers of

proprietaries, replenishing their forgotten studies with the dictum of some manufacturing pharmacist who enlightens them with all the brand-new therapy published in an advertising sheet with a high-sounding name, at a dollar a year and with a clinical thermometer thrown in, "Make it two and receive a leather pocket case with our specific drugs."

Many other men absorb a great amount of materia medica and are clever at prescription writing in the second year; but the clinical staff, educated in the old way, slights therapeutic application, fits patients to numbered combinations, and the labor of a year is lost. If the clinician prescribes nostrums, what can be expected of the young graduate? He naturally becomes a thoughtless, indifferent prescriber of the "elegant pharmaceutical preparations" of which he knows nothing except what he gleans from the manufacturer's literature—"a highly colored expression of printers' art"—and proceeds to medicate accordingly. Can drug therapy advance under these conditions?

These shortcomings might, to some extent, have been attributed to our lack of exact knowledge in the past; but today we have enough facts to make a perfectly rational teaching materia medica. It is the amount of facts and knowledge a physician uses that makes his work successful. Inert agents, misapplication, and faulty technique make a failure of the best of them.

If we would but teach and practise with the absolutely proven drugs, materia medica and drug therapy would be placed on a sound and rational basis.

The American Therapeutic Society has a duty to perform right here in preparing and presenting to the teachers and examiners a properly limited materia medica with a rational, scientific classification. This will at once give influence and impetus to a successful, logical, drug therapy.

In the first place, only drugs of indispensable value and, so far as practical, chemically assayed or physiologically tested, should be admitted. The manufacturing chemist and pharmacist and the physiological laboratory men can supply us with drugs of known purity and strength—dependable products, properly selected, properly manufactured, standardized, marketed, and dispensed.

This accurate knowledge of the important drugs will soon restrict the multitude of recognized and unrecognized remedies, give better control and better quality to these remedies, and enable the student to master everything concerning the selected drugs from pharmacognosy to pharmacodynamics, everything from solubility to incompatibility, everything from methods of administration to variations in action.

As stated in the special article of the A. M. A., "The Pharmacopœia and the Physician," Chapter XVIII, "The use of the term 'alterative' is often an admission of our want of exact knowledge of the mode of action of the drugs or remedies so classed." An illustration of this is given in Chapter XX: "Alteratives are tonics which in some unknown way favorably influence the process of nutrition which has been disturbed by disease." Now, if the

value of mercury as an alterative is most apparent through its influence on the *Spirochæta pallida,* why is it any more of an alterative than quinine in its application to the plasmodium hematozoön when the latter has been classed as a tonic and antiperiodic?

Chapter XVII takes up "Circulatory Depressants," beginning with "The circulation may be depressed by acting on those structures the stimulation of which causes an increase in blood-pressure," an accidentally erroneous statement. But why this uncertain, unthinking classification? The present-day teaching and textbook classification, with few exceptions, throw small light on the practical application of scientific drug therapy. The continued use of the old class terms such as tonics, alteratives, antiperiodics, emmenagogues, etc., is, with our modern understanding, to say the least reactionary, if not ridiculous.

This teaching of the materia medica under a rational classification, to be authentic and conclusive, must bear the stamp of approval of the majority of our membership. While not wishing to be regarded as underestimating any plan the Society is now undertaking to advance therapeutics, I believe the plan here suggested would be of particularly great and lasting benefit to the profession at large. Giving the teacher and pupil a materia medica of proven drugs so classified as to develop the reasoning rather than the memory machine, a synopsis that could be elaborated by the textbook writers and used as a guide by state board examiners, is a plan the accomplishment of which will place drug therapy on a lasting, rational, scientific basis, create delight and gratitude in an overdrugged profession and student body, and reflect lasting credit upon The American Therapeutic Society.

THE ABSURDITIES AND THE COMMERCIALISM OF THE PROPOSED NINTH DECENNIAL REVISION OF THE UNITED STATES PHARMACOPOEIA.

By OLIVER T. OSBORNE, M.D.,

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Objection was raised by the author to the officialization of such articles as lemon-peel and orange-peel. Drugs the activities of which were mythical and historical, such as marigold, saffron, condurango, etc., should not appear in the Pharmacopœia. One hundred and fifty-eight drugs had been deleted by the subcommittee on scope of the new Pharmacopœia, but 79, or just one-half, of these deletions had been voted in by the executive committee in spite of the adverse recommendation. The executive committee had also exercised its prerogative by approving a number of drugs and preparations that had not even come before the subcommittee. Among such drugs were fluidextract of phytolacca, tincture of quillaja, oleoresin of parsley seed, purified animal charcoal, etc. It should be remembered, in urging deletions, that any physician can obtain a drug or preparation omitted from the new Pharmacopœia by the standard placed in an older Pharmacopœia. One hundred and seventeen thousand prescriptions had been collected from different parts of the United States as a basis for estimating, by the number of times a drug had been ordered, whether it had therapeutic value or not. The result of this would be, on the contrary, that the Pharmacopœia would be founded more or less on commercialism, and not on therapeutic values. Officialization of a worthless drug allowed the pharmaceutical houses to make useless preparations of it and compelled the druggist to carry these on his shelves. Standardization, used as an argument in favor of the admission of all kinds of drugs and preparations by those desiring a large Pharmacopœia, was not a valid one, as such articles as lemon-peel and saffron could not be standardized. Admission of the following articles to the next Pharmacopœia was considered by the essayist unnecessary and unscientific, many of them being unstandardizable and the rest required to come up to a certain standard by the pure-food laws: Adeps, althæa, amygdala dulcis, amylum, aqua, aurantii amari cortex, aurantii dulcis cortex, cantharides, cera alba, cera flava, cetaceum, charta sinapis, coccus, coriandrum, emplastrum adhesivum, extractum malti, fœniculum, gelatinum, gossypium purificatum, humulus, limonis cortex, limonis succus, linum, lycopodium, maltum, manna, mel, mel depuratum, mel rosæ, mentha piperita, mentha viridis, oleum gossypii seminis, oleum lini, oleum olivæ, paraffinum, pepo, pix liquida, pyroxylinum, resina, rosa gallica, saccharum, saccharum lactis, sapo, sassafras, sassafras medulla, sevum præparatum, sodii chloridum, terebinthina, terebinthina Canadensis, ulmus, vanilla. Many of the crude spices recognized in the Pharmacopœia were not needed, their oils being official. A considerable number of metals and chemicals of no drug value had been approved for the new Pharmacopœia. None of the following drugs or their preparations being needed to treat a condition that might

not be better treated by other more active remedies, their officialization was unnecessary: Anthemis, arnica, berberis, calendula, calumba, chondrus, cimicifuga, condurango, convallaria, crocus, eriodictyon, frangula, gambir, gossypii cortex, grindelia, guaiacum, hæmatoxylon, kino, krameria, lactucarium, leptandra, lupulinum, matricaria, mezereum, moschus, oleoresina petroselini, oleum hedeomæ, pareira, phytolacca, pyrethrum, quassia, quillaja, rhus glabra, sabal, sanguinaria, sarsaparilla, senega, serpentaria, staphisagria, stillingia, sumbul, taraxacum, triticum, uva ursi, xanthoxylum, zea. Mixtures containing useless or very numerous ingredients should not be officialized, viz., elixir adjuvans, 11 ingredients; elixir ferri, quininæ et strychninæ phosphatum, 15; extractum colocynthidis compositum, 5; infusum sennæ compositum (black draught), 5; liquor ferri et ammonii acetatis (Basham's mixture), 12; mistura glycyrrhizæ composita (brown mixture), 19; mistura rhei et sodæ, 5; pilulæ catharticæ compositæ, 8; syrupus hypophosphitum compositus, 10; syrupus sarsaparillæ compositus, 7; syrupus scillæ compositus, 5; tinctura benzoini composita, 5. On the other hand, a useful drug should, if possible, receive a standard in the Pharmacopœia. In spite of this, the following valuable drugs had been refused admission by the executive committee after recommendation by the subcommittee on scope: Acetylsalicylic acid, ammonium sulphoichthyolate, diethylbarbituric acid, sodium diethylbarbituric acid, epinephrin, benzoylvinyldiacetonalkamine hydrochloride, amidin, para-aminobenzoyldiethylaminoethanol, the methyl ester of para-aminometaoxybenzoic acid, a well-known silver proteid, and dimethylaminobenzoylpentanol hydrochloride.

DISCUSSION.

Dr. Harvey W. Wiley, Washington, said that he had listened to the paper with great interest. He had been one of those who had had an opportunity to express an opinion as to the substances that should or should not be admitted to the book. He had no doubt but that some of Dr. Osborne's criticisms were justified, but there was a great difference of opinion upon this point among medical men. If 117,000 prescriptions from physicians were collected and it was found that one particular ingredient appeared in a considerable number of them, it seemed reasonable to conclude that the ingredient had some therapeutic value. Some of these humble drugs might yet become the head of the corner. Dr. Osborne had done much for the Pharmacopœia. It was a much better book than it would have been had he not been a member of the committee. It would be found to be a good book in spite of any defects it might have. Even if we should happen to invite a plebeian to the feast it would not hurt the others. To the other diners it would be none the less good. We could enjoy the meal even if a few peasants were present. He himself had objected to some of the drugs mentioned by Dr. Osborne and in case of a number of them had asked a reconsideration, which had been granted. While it was true that some of them could not be adequately standardized, it could at least be required that they be pure and made of wholesome materials. It was well to have a man of radical tendencies like Dr. Osborne upon the committee. He himself had been called a crank more than once. Even cranks had their place. Criticisms like those in the paper were good; they did the book good.

Dr. Oliver T. Osborne said that if Dr. Wiley was a crank he was glad to be in his class. As to the 117,000 prescriptions, he did not think this an adequate test. The frequency with which a drug was used was no criterion as to its value. It might be foisted upon the profession through advertisements.

THE TREATMENT OF DIABETES AND PREGNANCY.

By REYNOLD WEBB WILCOX, M.D., LL.D.,

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Because of the confusion which still is found in the literature, the *diagnosis* must be briefly considered. In the first place, reduction of Fehling's solution does not necessarily indicate glycosuria. The errors due to the presence of uric acid, much mucus, and such drugs as salicylic acid, hydrated chloral, to poisoning by carbon dioxide, amyl nitrite, and turpentine, and sometimes possibly chloroform, camphor, mercury, morphine, hydrocyanic acid, sulphuric acid, alcohol and lead compounds, must be excluded. Even when the urine has been demonstrated to contain sugar, the distinction between glycosuria and lactosuria (the former occurring in about 1 per cent. of the women; the latter very frequently, especially in the last month) must be made; in the case of lactose the phenylhydrazin and fermentation tests do not give the reaction. The polariscope also gives definite information. Lastly, granted that a glycosuria exists, the diagnosis of diabetes must rest on the glycosuria and, in addition, emaciation, weakness, inordinate hunger, marked thirst, and increased discharge of urine, which may contain acetone, diacetic or oxybutyric acids.

The diagnosis of pregnancy and diabetes having been established, another distinction must be sharply drawn: Has a women suffering from diabetes become pregnant, or has diabetes supervened in a pregnant woman? Either may occur, but a woman who is diabetic rarely becomes pregnant, for several reasons, among which may be cited: the comparative infrequency of diabetes in women; the usual incidence of diabetes about the time of the menopause, when pregnancy is decidely rare; the impaired nutrition of the patient, and the association of structural changes and functional derangements of the internal genital organs in a woman suffering from diabetes, amenorrhea, particularly, being the rule.

Of women who become diabetic during pregnancy, two classes must be distinguished: (1) those who have been glycosuric in previous pregnancies, and (2) those who have developed diabetes during the pregnancy in question. The first class is difficult to establish, but it undoubtedly does exist, and the prognosis is less serious than when a diabetic woman becomes pregnant, although more important than when pregnancy is marked for the first time by diabetes. There is no doubt but that in pregnancy generally the power of assimilating carbohydrates is lessened; this is accepted as a fact deduced from observation. In nearly two-thirds of women after the fourth month of

pregnancy the ingestion of 100 grams of grape-sugar will be followed by the appearance of glucose in the urine within six hours. The reason for it is not quite apparent beyond that the vagaries of appetite of a pregnant woman may lead to the ingestion of an inordinate amount of sweets. Yet diabetes may supervene when no such history is obtainable. It is possible that a toxemia resulting from the products of conception may favor the glycosuria.

When a diabetic woman has become pregnant it can be safely said that the results can be determined with considerable probability. Each condition will react unfavorably upon the other. The duration of life for the mother will be shortened to one-half or one-third of that which may be expected for diabetes without this complication. The fetus is likely to be delivered before full term, dead and often macerated; or if full term is reached, the child is not likely to long survive its birth. Therefore, the life of the child need not merit so profound a consideration when a premature delivery is debated. For the mother, parturition will probably be prolonged and the dangers of sepsis markedly increased.

The vulnerability of the tissues of a diabetic to microbial infection is well known to be increased at least one-third, and this probability of sepsis should be considered, not only in connection with labor at full term, but as well with premature delivery, either natural or induced.

When a pregnant woman has become diabetic, other phases of the problem present themselves. The nutrition and strength of the mother, especially of her muscles, have been impaired. Hydramnios is markedly frequent; the amniotic fluid containing glucose in about one-half of the instances. In severe diabetes hydrocephalus has been found; in milder ones a child of inordinate size may be born at term. There is the same liability to sepsis, although perhaps in less degree.

The above facts, collected from the literature, form sufficient basis upon which a plan of *treatment* may be provided for each patient. In the first place, as to the diabetes: Whatever medicinal treatment one prefers should be carried out, the type of diabetes having been carefully ascertained. Lime salts should be used sparingly, and this is of particular note because several of the natural waters in vogue in the treatment of diabetes are calcareous. For the purpose of diagnosis only, an absolutely carbohydrate-free diet should be employed, and that for as short a period as is possible for accurate determination of the type of the disease. From the standpoint of the obstetrician the so-called diabetic diet is objectionable. The typical diets in parallel columns will illustrate this:—

Diabetic Diet.	Pregnancy Diet.
May take:	*May take:*
Soups and broths of beef, chicken, mutton, veal, oysters, clams, terrapin or turtle (not thickened with any farinaceous substances), beef-tea.	Soups and broths of mutton, chicken, oysters, and clams.
Fish. Shell-fish and all kinds of fish, fresh, salted, dried, pickled or otherwise preserved (no dressing containing flour).	Fish. When it agrees. Raw oysters, raw clams.

Eggs. In any way most acceptable.

Meats. Fat beef, mutton, ham or bacon, poultry, sweetbreads, calf's head, sausage, kidneys, pig's feet, tongue, tripe, game (all cooked free of flour, potatoes, bread or crackers).

Farinaceous. Gluten porridge, gluten bread, gluten gems, gluten biscuits, gluten wafers, gluten griddle cakes, almond bread or cakes, bran bread or cakes.

Vegetables. String beans, spinach, beet-tops, chicory, kale, lettuce (plain or dressed with oil and vinegar), cucumbers, onions, tomatoes, mushrooms, asparagus, oyster plant, celery, dandelions, cresses, radishes, pickles, olives.

Desserts. Custards, jellies, creams (without sugar), walnuts, almonds, filberts, Brazil nuts, cocoanuts, pecans.

Drinks. Tea or coffee (without sugar), pure water, peptonized milk.

Must not take:

Liver, sugars, sweets or starches of any kind, wheaten bread or biscuits, corn bread, oatmeal, barley, rice, rye bread, arrowroot, sago, macaroni, tapioca, vermicelli, potatoes, parsnips, beets, turnips, peas, carrots, melons, fruits, puddings, pastry, pies, ices, honey, jams, sweet or sparkling wines, cordials, cider, porter, lager, chestnuts, peanuts.

Eggs. Excepting fried.

Meats. Beef, mutton, chicken, game. Butter, fat, sweetbreads, ham.

Farinaceous. Good wheat bread, corn bread, oatmeal, wheaten grits, rice.

Vegetables. Baked potatoes, spinach, macaroni, greens, cresses, celery, green peas, lettuce, asparagus, green corn, oranges, grapes, stewed fruit.

Desserts. None but the plainest.

Drinks. Water (freely), cocoa, milk, tea, and coffee.

NURSING WOMEN:

During the first three or four days after delivery the diet should consist of liquid food made of the cereal grains, with a small allowance of animal broths. After the bowels have been thoroughly opened, begin to resume the normal diet. Allow tender beef, mutton, chicken or game once a day, with baked potatoes and green vegetables. Wine jelly, blanc mange, and simple custards should constitute the desserts.

At the end of ten days the regular meals should be given, consisting of the most nutritious and digestible substances. Cocoa and chocolate may be used. Nursing women should avoid all indigestible meats, made dishes, gravies, rich desserts, pastries, etc.; coffee, stimulants, and acid fruits. *Above all they should not be subjected to depressing mental or nervous influences.*

Must not take:

Pork, veal, stews, hashes, gravies, made dishes, rich desserts.

The only way to deal with this conflict of purpose between internist and obstetrician is to keep the carbohydrate intake as near the assimilative powers as is possible, regarding small percentages of glucose as less undesirable than an impaired nutrition of the mother. But the moment that headache or vertigo occurs, or acetone or diacetic or oxybutyric acid appears in the urine, and these symptoms and signs are not promptly relieved by high rectal irrigations containing maximum doses of sodium bicarbonate, the carbohydrate ingestion must be increased regardless of theoretical objections.

The problems for the obstetrician are complex. He should take accurate pelvic measurements and estimate in so far as possible the size of the child and the amount of amniotic fluid. He should be prepared to induce labor at such time as the size of the child and lumen of the passage indicate for a speedy and safe delivery. He should be prepared to remove a dead fetus from the uterus at the earliest possible moment. Finally, he must demand for himself and his assistants and nurses absolute asepsis, remembering that a diabetic has no safe borderland of natural or acquired immunity to bacterial infection.

The problem which presented itself for solution and led to a search of the literature, with the results above given, was as follows: A young woman, recently married to a former patient, residing in a suburban town, presented herself suffering from an acute catarrhal bronchitis, of several days' duration. She was four months' pregnant. The urine at that time showed nothing abnormal excepting a marked difference between the solids of the urine of fasting as compared with those of digestion. The bronchitis promptly disappeared under treatment, and on a visit for inspection a month later the urine of digestion was found to contain 2¼ per cent. of glucose. As there was possible contamination of one bottle, the urine was examined a week later, and both specimens found to be normal. The same report was made again after two weeks. Five weeks after the discovery of glucose in the specimen contained in the supposedly contaminated bottle, 1¼ per cent. of glucose was found in the urine of digestion. The patient was sent for, and gave a history of increased appetite, annoying thirst, some loss of flesh, and marked weakness—symptoms which had been denied in the previous month. A carbohydrate-free diet for a week, for experimental purposes, reduced the glucose by ⅞ of 1 per cent. in the urine of digestion; ½ of 1 per cent. of glucose was found in the urine of digestion, and none in that of fasting, three days later. Two weeks from this date, upon as restricted a diet as was deemed prudent for a pregnant woman, the urine of digestion contained 2¼ and that of fasting ⅝ of 1 per cent. of glucose. Uranium nitrate, ½ grain, thrice daily, was given, with the result that in ten days, although the daily amount passed was 80 ounces, the glucose content had fallen to 5/16 in the urine of digestion and ⅕ of 1 per cent. in the urine of fasting, and three weeks later had disappeared entirely. As soon as it was apparent that the diabetes was controllable, and a viable child probable, measurements of the pelvis were made by my associate, Dr. Henry Hubbard Pelton; they were found to be normal, excepting that the internal conjugate was more than a centimeter

(1.1) too short. The fetal heart was 140, heard to the right and below the umbilicus, and the head seemed small. The husband was advised that the patient should be under competent supervision by an internist and by an obstetrician. The basis for this recommendation was the considerable maternal and high fetal mortality resulting from diabetes complicating pregnancy, according to the British authorities and, to a less degree, to the French. The German writers, however, making no close distinction between lactosuria in pregnancy and glycosuria, on the one hand, and between glycosuria and diabetes on the other, attribute much less importance to the condition. The mother declined the advice. One month before the expected labor Dr. Henry Clarke Coe was called in consultation and, notwithstanding that his attention was called to the shortened anteroposterior diameter of the pelvis, and the probabilities of a large child, sanctioned her attendance at her country residence. Apparently, he was influenced by the German authors in reaching this conclusion.

A child was born at term, said to have weighed "over seven pounds," after a tedious instrumental delivery, the local physician having been assisted by a nurse pressed into service. Three weeks later the urine contained no glucose, but 0.33 parts per mille (Esbach) of albumin. Six weeks after her confinement the husband reported that the patient was still confined to her bed, having never been free from fever, and requested that she be seen at his country house. The urine, sent on the previous day, contained ⅛ of 1 per cent. of glucose in both specimens. The following day the patient was found to be suffering from septicemia, the cause probably being a perineal abscess. There was a marked femoral phlebitis of the right side, which rapidly cleared up after applications of the ointment of soluble silver. The next day my associate opened the abscess and drained it, with complete recovery. At my visit the father inquired why the child did not use his left arm, and why the application of faradic electricity, as ordered by the local physician, had not benefited. Investigation showed the arm in the position usual after fracture of the clavicle. No evidence of either form of so-called "obstetrical paralysis" could be found. It was impossible to locate the outer end of the clavicle. Two days later Dr. Carl Beck made a Roentgen ray plate which showed a downward and backward dislocation of the outer end of the clavicle. This he reduced, and afterward kept the bone in place by suitable bandages, with recovery in due time. Two months from the date of the confinement but a trace of glucose was found in the urine, and both mother and child had recovered from the disabilities attending the labor.

The treatment for a diabetic woman who has become pregnant is as follows: If hydramnios exists (usually in about one-third of the instances), or the amount of glucose in the urine is excessive and uninfluenced by treatment, or the loss of flesh and strength is marked and, absolutely, if the fetus is dead, the uterus should be emptied at once. The viability of the child is usually problematical. It is needless to state that a diabetic woman should not marry or, if married, should not be allowed to become pregnant.

If a pregnant woman has become diabetic the dangers of labor are

increased, not only from the impaired vitality and lessened resistance toward infection on the part of the mother, but as well by reason of the fact that in severe diabetes a dead and even macerated child may result, or, if the disease is mild, one of inordinate size, which, if the time of labor is not anticipated by operative interference, may endanger the life of both. On the part of the mother, a curable may be converted into an incurable diabetes by succeeding pregnancies.

In the glycosuria of pregnancy each patient must be carefully studied, and that procedure conducted which is justified by the condition of the patient and the persistence of this symptom.

Of the treatment of the diabetes itself, no extended consideration need be given beyond that which the disease demands in women who are not pregnant. Obviously, more latitude in diet is allowable, and it is usually safer to exceed the tolerance for carbohydrates, even with the persistence of small percentages of glucose in the urine, than to be too much a slave to theory. Careful and continuous observation is demanded, in order promptly to meet not only the onset of acidosis, but as well that of toxemia, frequent in pregnancies of the non-diabetic.

DISCUSSION.

Dr. Alexander D. Blackader, Montreal, said that if he had been asked to see a case like that described in the paper in consultation he would have suggested the services of a proper accoucheur. Just why he had been asked to open the discussion upon this subject when he had not seen a case for years, he did not know. He mentioned, however, 2 cases among friends, which he had referred to other physicians. In 1 there had been no return of the glycosuria after term; the other had gone on to confirmed diabetes. He thanked the essayist for bringing this subject to the attention of the Society. More should be written upon it. He was glad to learn that uranium nitrate had proved of value in the treatment of the glycosuria.

Dr. Robert T. Morris, New York, said that pregnancy was somewhat out of his line, but he believed that in many cases glycosuria was due to pancreatitis and the consequent squeezing of the islands of Langerhans caused through the effect of bacteria ascending from the duodenum. As soon as the pancreatitis was relieved the glycosuria disappeared. The indication was to do away with the bacterial infection if possible.

Dr. J. J. Kinyoun, Washington, D. C., said that in 200 autopsies at the Tuberculosis Hospital in that city he had noted changes in the pancreas with squeezing of the islands of Langerhans in a considerable proportion of cases. Only in rare instances, however, did such patients give a history of diabetes.

Dr. O. T. Osborne, New Haven, Conn., said that he had already spoken of uranium nitrate. There was good authority for the statement that it was a poison, particularly to the kidneys, and he did not believe that it could be given without danger. It had no therapeutic value commensurate with the dangers attending its use.

Dr. Wilcox said that there was no doubt but that uranium nitrate was a poison, but the danger to the kidneys could be obviated through frequent examination of the urine.

Dr. Osborne asked Dr. Wilcox how much of the drug he gave.

Dr. Wilcox replied that he did not give more than 2 grains a day.

THE TREATMENT OF ARTERIOSCLEROSIS.

By LOUIS FAUGERES BISHOP, A.M., M.D.,

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A COMPLETE discussion of the treatment of arteriosclerosis within the limits of a paper is manifestly impossible. The condition is so widespread, so prolonged, and leads to so many complications that it is coextensive with a considerable fraction of the practice of internal medicine and the specialties. It will therefore be necessary to leave out of account for the present (and I trust it may be left out of the discussion) symptomatic treatment, or the treatment of complicating conditions such as abnormalities of blood-pressure, degeneration of organs following circulatory accidents, and primary kidney disease.

The reason that so little advance has been made in our knowledge of the treatment of this disease is that it labors under a misnomer, and that attention has been directed to the structure of one set of organs, the blood-vessels, while, in fact, the tissues of the whole body are equally the seat of the disease. The clinical condition known as arteriosclerosis no more essentially consists of sclerosis of the arteries than typhoid fever consists of ulceration of the intestines. But ulceration of the intestines in typhoid fever is a local manifestation of a general disease, and, in the same way, thickening of the arteries is the result of a general condition. There may be a localized ulceration of the intestines constituting a primary disease; and there is a form of inflammation of the arteries that seems to be local. But primary ulceration of the intestines has nothing to do with the ulceration of typhoid fever, and endarteritis has nothing to do with the clinical condition known as arteriosclerosis, which attacks a large proportion of the human race after middle life.

Arteriosclerosis is a disorder affecting the cells of the whole body, including the blood-vessels, in such a manner that at length circulatory difficulties arise, and the heart, blood-vessels, and kidneys become conspicuously involved. But coincidently, and not consecutively, the kidneys, liver and lungs undergo damage. This may be due to other things, but it seems to me that in the vast majority of cases it can be traced to the effect of substances that are, or have become, poisonous to the cells; and, furthermore, that these substances are ordinarily derived from proteins taken into the body as food. *It is not the effect of proteins on the individual, but the reaction of the individual to the proteins,* and when the process begins it is not because any change has taken place in the particular protein, but that something has taken place in the individual which makes him susceptible to damage by it. The sensitiveness to proteins is an important chapter in pathological physiology. It is very familiar when it presents itself in the form of food idiosyncrasies, though, strangely

enough, the vegetable proteins, which cause the greatest discomfort in their reaction, cause the least harm. A person is safeguarded if the foods to which he is sensitive cause discomfort.

Arteriosclerosis is likely to begin when, through some accident of food poisoning, severe illness, nervous shock, or some unknown incident, the cells of the body become sensitive to particular proteins found in customary food. From that time on, provided the ingestion of this food is continued, there is a continuous subsymptomal anaphylaxis leading to irritation, and finally to changes in the tissues—perhaps to replacement of some of the cells by connective tissue. This takes place throughout the body: In the blood-vessels, leading to arteriosclerosis, from which the disease takes its name; in the heart, leading to cardiosclerosis; in the kidneys, leading to loss of kidney tissue; in the liver; in the lungs, and in the nervous structures. The circulation of blood through the damaged body becomes a greater and greater task, and the damaged heart and blood-vessels undergo changes and hypertrophy from functional overactivity. The impaired organs lead to failure of internal secretions and of general metabolism, and the person who started with a sensitiveness to a single protein, after twenty-five years is found presenting the picture of the terminal stages of so-called Bright's disease.

If this be a true picture, a logical conclusion is that the treatment of arteriosclerosis must consist in the discovery and removal from the dietary of such protein, or proteins, as are unfriendly to the individual person; and as the absorption of protein is profoundly affected by the condition of the intestinal canal, much attention is justifiable to those conditions that have been discussed of late under the titles of "intestinal putrefaction" and "autointoxication."

These considerations have led, with me, to the development of a system of diet that I call for my own convenience, the *few-protein diet.* So long as the person is eating all kinds of proteins it is very hard to draw conclusions, for even a small quantity of an offending protein may be sufficient to cause a continuous cellular irritation. And, curiously, there is some foundation for the belief that sensitiveness to a particular protein may be overcome if that protein be massively administered. The irritation seems to be due to a moderate quantity.

As a practical matter, the treatment of arteriosclerosis founded upon the conception of the disease outlined above consists in a modified form of such a plan as one would follow in acute food poisoning. Just as in acute food poisoning castor oil is universally and eternally acknowledged as the remedy without a peer, so also does it find an important place in the management of conditions of long standing and gradual onset. In the presence of well-developed arteriosclerosis and of the picture of subsymptomal continuous anaphylaxis, an ounce of castor oil is ordered at intervals of forty-eight hours for three doses. Then after a week another dose is given, and as long as the person is under observation a dose is ordered at intervals of not less than one month. Out of the diet are taken all eggs, fish, meat and fowl, as well as all soups, except vegetable soups without stock. Cheese is allowed, as furnishing protein in a safe form, and later chicken may be allowed if experimentally it is found that the blood-

pressure does not rise as a result of it. In small doses iodine seems to do as much good as in larger ones. The reduction of blood-pressure by drugs for the sake of repressing this symptom of the disease has been sufficiently criticised to render its consideration unnecessary. On the other hand, nitroglycerin is the great symptomatic remedy for all emergencies arising in the course of the disease, whether it be attacks of dyspnea, pain, vertigo, or even edema of the lungs.

Out-of-door exercise is essential to the welfare of the sufferer from this condition. The cells of the liver, kidneys, and probably, in a measure, all the organs suffer impairment by their reaction to the protein that in the individual instance causes the disease. There is no diuretic so valuable as exercise in cirrhosis of the kidney, and, for the cirrhotic liver, no stimulant as efficient. Out-of-door life is lifesaving, particularly to the dweller in cities. It will not prevent arteriosclerosis in the country dweller, but even here it will allow vices of eating that would kill the city man in short order.

For the cure of arteriosclerosis, the underlying secondary causes must be removed. Among these, mental stress is the most important, and the development of a sound philosophy of life is required in combination with the castor oil, the "few-protein" diet, and the out-of-door life.

DISCUSSION.

Dr. J. Madison Taylor, Philadelphia, spoke of the importance of early recognition of the disease. Dr. Bishop had said in a former paper that there were practically no manifestations in the early stages to bring the case to the attention of the physician. This being true, it was fortunate for the individual if he had some other form of breakdown, because then the arteriosclerosis might be recognized and treated in its incipient stage.

Dr. Edward D. Fisher, New York, spoke particularly of the etiology. Arteriosclerosis, he said, was not a general disease of the whole body, but primarily a diseased condition of the vessels. At first it did not affect the body as a whole, but was a localized condition. Gradually, however, it might affect one organ, or part, after another—the heart, kidneys, nervous system—until the body as a whole suffered. Alcohol, overeating, gout, etc., were only predisposing causes in most cases. Laboring men were especially susceptible to arteriosclerosis, but as a rule they were neither excessive eaters nor drinkers. But they were hard workers, and work and heredity were important factors in the etiology, whether the individual was a laborer or a financier at his desk. Everyone was furnished with vessels good for a given time under proper conditions. If he used them conservatively he might live out his allotted time. If he did not, his life was shortened accordingly. Treatment must of necessity be symptomatic only. The best that could be hoped was to stay the progress of the disease. A proper diet, open-air exercise, a quiet life and freedom from worry and care—all of these were important factors. The diet should be regulated to suit the need of each individual patient. It should not be too strict where the patient was weak or where his occupation required great exertion. In case of a laborer, for example, it would not do to take away meat. General principles of treatment should be broken as conditions necessitated.

Dr. Robert T. Morris, New York, suggested that the response of the blood-pressure to certain proteins might be utilized as a test for arteriosclerosis in its early stages.

Dr. Osborne emphasized the danger of changing the diet suddenly or radically. The same was true of exercise and other factors ordinarily employed in the treatment. He had obtained good results from the use of iodides.

Dr. Spencer L. Dawes, Albany, said that the salines or calomel were preferable to castor oil. He had found the after-constipating effect a decided objection to its use. He agreed with Dr. Fisher as to the span of life of the vessels. The same might be said of the heart.

Dr. George Herbert Evans, San Francisco, said that greater efficiency in treating the condition must be based upon a better classification of the patients along etiological lines. He had been impressed with the frequency with which syphilis occurred in arteriosclerotic patients, and he did not believe that the Pacific coast was worse than the Atlantic coast in this regard. Cases ascribed to overwork, overeating, etc., were not infrequently the results of syphilis. The disease should be eliminated as an etiological factor before treatment was instituted.

Dr. Morris inquired whether the poison of syphilis were not a protein poison.

Dr. F. M. Pottenger, Los Angeles, Cal., said that Thayer had shown a few years ago that typhoid fever was not infrequently followed by hardening of the arteries. In his own work he had observed that some hardening was usually present in tuberculous patients who had suffered from clinical tuberculosis for two years or more.

Dr. J. J. Kinyoun, Washington, D. C., said that in the post-mortem examination of tuberculous subjects he had found marked arterial changes in 40 per cent. of the cases. These must have been due to causes like alcoholism, syphilis, etc., as they evidently antedated the tuberculosis.

Dr. Bishop said that in his own experience no cause could be assigned in about nine-tenths of the cases. In the remaining one-tenth the cause was alcohol, lead, syphilis, or one of the other causes ordinarily cited. Too much attention was paid to the advanced cases, and not enough to the insidious cases, although the latter were the most important. Bacterial arteriosclerosis was due to protein poisoning, as suggested by Dr. Morris. Heredity was only a matter of susceptibility after all. He commended Dr. Osborne's definition of iodine as a thyroid stimulant rather than an alterative in these cases. He did not believe in excluding all protein from the diet. The effort should be to ascertain the particular protein causing the trouble, and eliminate it. It was sometimes revealed by the special craving of the patient for it when it was withdrawn. He cited the case of a patient with blood-pressure of 230, who suffered from shortness of breath and the usual symptoms. He put him upon a single protein diet, and the blood-pressure fell to 200. The man, however, developed an uncontrollable longing for meat, and he went around from one physician to another until he found one who allowed him to eat it. As a result, his blood-pressure went up, and he felt better for a time, but soon became worse and died. As to laborers, many of them had syphilis and all of them overate. As to salines, a circular issued by the physicians of Carlsbad advised against sending patients with advanced arteriosclerosis there, as they did not do well. It was the custom to send them to Nauheim, in other words, to put the patient into the mineral water, and not the mineral water into the patient. Table salt and all salts were unfriendly to arteriosclerosis. He saw many patients who had taken salines for years, and it was necessary for him to overcome the prejudice in their favor.

ANTITYPHOID INOCULATION.

By MAJOR F. F. RUSSELL, Medical Corps, U. S. A.

The writer, largely by statistical tables and graphic charts, summarized the effects of antityphoid vaccination up to the close of the year 1912 in the United States Army, both at home and abroad, among the officers and enlisted men. During the last four years approximately 200,000 persons had been immunized, entirely without fatalities or any untoward results. In the army none but the healthy were immunized, any illness, of whatever nature, automatically postponing vaccination until after recovery. The immunity, no doubt, diminished gradually, as after vaccination against small-pox. The custom at present was to revaccinate at the beginning of each four-year period of enlistment, not because all immunity had disappeared, but because it seemed unwise to trust to anything less than the maximum immunity obtainable. The practice of vaccinating against typhoid had been a pronounced success in the naval and military services, in hospitals, schools, institutions, among pleasure seekers, and in contractors' camps, especially those located on watersheds—in fact, wherever in civil and military life it had been used. Its more general use, especially among the young, was advisable. The fact that it occasionally failed to afford complete protection was not a valid objection to its use, but rather an indication for its repetition, at intervals to be determined upon in the future. It would certainly prove as efficacious in civil life as in the army, and its extended use would hasten the time when typhoid fever will become a negligible factor in our public-health problems.

CURRENT DEVELOPMENTS AND PROBLEMS IN VACCINE THERAPY.

By A. PARKER HITCHENS, M.D.,

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THERE is a growing feeling in the medical profession that vaccine therapy has reached the point at which its value and its limitations may be clearly defined. Vaccines are coming to be considered as the chief resource in the treatment of certain infectious conditions. Diseases caused by bacteria may be divided into three classes in regard to their relation to bacterial vaccines: (1) those in which the vaccine meets every therapeutic requirement; (2) those in which its effects, while encouraging, are more or less uncertain; (3) those in which it is of little or no value.

Theoretical objections to the use of vaccines therapeutically have been based upon the fear that injections would "add fuel to the fire." According to Dr. Theobald Smith the difficulty of reproducing in laboratory animals the exact conditions of chronic infectious processes in man is responsible for the inadequacy of current theories to explain the beneficial effects of vaccines.

The writer is of the opinion that the present limitations of vaccine therapy may be widened by further investigation. Such investigation would include attempts to improve the antigen, and increased emphasis would be placed upon some phases of the work which are in need of development.

PREPARATION OF VACCINE.

Efforts to improve upon the methods of preparation of bacterial vaccines should be directed as follows:—

1. To obtain a purer antigen.

2. To obtain a vaccine which will cause a minimum of local and general reaction.

3. To obtain a vaccine which will render the subject immune within the shortest possible space of time.

4. To obtain, if not a purer antigen, at least one in a state more readily available when brought into contact with the tissue.

The use of smaller doses than were formerly given has brought the local and general reactions down to such a degree that they are almost negligible. Our purpose is, however, to do away with the reaction entirely, retaining at the same time the immunizing response. To do this several methods come under consideration. It has been observed that bacteria grown upon media containing peptone are more prone to cause reactive phenomena than bacteria grown upon media without peptone. Consequently, two methods are used to free the bacteria of peptone—first, employing culture media containing no peptone; second, washing the bacteria in saline solution in a centrifuge. In

connection with these two methods consideration must always be taken of whether the lack of peptone in the media interferes with the antigenic properties in any way and whether the washing process removes any essential part of the bacterial cell.

Autolyzed Bacteria.—Rosenow[1] has shown that when bacteria are suspended in saline solution the latter becomes very toxic as a result of autolysis. He has demonstrated that in the case of the pneumococcus the toxic autolysate is not necessary for the production of immunity, confirming the statement of Vaughan that the poisonous part has no relation to the antibodies which make the system refractory to disease. This suggests the possibility that by autolysis we may obtain a purer antigen.

Vaughan's Split Products.—After bringing about the chemical splitting of the protein molecule into a poisonous and a non-poisonous part, Vaughan believes that the poisonous part is a poison, and nothing but a poison, and takes no part in antibody formation, while it may add to the toxemia already present. If from the vaccine we can eliminate the poisonous fraction, we may be able to administer much larger doses of antigen without fear of a negative phase.

Antigens.—Some of the methods now employed for the preparation of antigen to be used in the complement fixation reaction may prove efficient in the preparation of vaccines, though it is probable that the combining substances of the antigen are chemically related to the lipoids, while the substances that have to do with the formation of antibodies are proteins.

Nucleoprotein.—Efforts to obtain the intracellular toxins and to isolate the nucleoproteins from bacteria have shown that the extracted nucleoprotein is a highly efficient vaccine.

Digested Bacteria.—Hirschfelder[2] has prepared a vaccine by the partial digestion of bacteria, and has obtained encouraging clinical results. There are certain difficulties in this method, as it offers great possibilities for variation and the biproducts of digestion are not eliminated—a point which might be important if the hydrolyzing process should reach a certain stage. This vaccine is thought to belong to the class that contains the antigen in a form more readily available for the tissues. The question arises whether the profound reactions following the use of such vaccines may not be largely responsible for clinical improvement, and whether similar results would not follow the administration of a solution of peptone.

Some of the methods given above may prove practical for the production of vaccines from sporogenic bacteria.

Sensitized Vaccines.—Sensitized vaccines have been used since the work of Babès (1891) in attempts to secure immunity quickly against rabies, diphtheria, hog erysipelas, plague, and anthrax. The results of this work show that the aptitude to elaborate active immunity and the duration of immunity are in inverse ratio to the quantity of serum in the mixture.

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1 Jour. Inf. Dis., 1912, vol. x, pp. 113-128.

2 Jour. Amer. Med. Assoc., 1912, vol. lix, p. 1373.

A decided advance in this line of work was made when Besredka[3] suggested the removal of the excess of serum by washing the sensitized bacteria in a centrifuge. Washing does not break up the union between the bacteria and their antibodies. Such sensitized bacteria should in theory be more easily handled by the tissues, as the body contains complement and the addition of complement alone is needed to bring about the disintegration of the bacteria. The technique of the preparation of sensitized vaccine as at present used in the Pasteur Institute is given by Broughton Alcock.[4]

Since the publication of the method by Besredka, it has been adopted by other workers for the preparation of vaccine for rabies, hemorrhagic septicemia in cattle, tuberculosis, typhoid fever, Asiatic cholera, bubonic plague, etc. Sensitized vaccines are to be preferred in the treatment of hemorrhagic septicemia in cattle, because, in an epidemic, if the ordinary vaccine is injected into an infected animal in the incubation period of the disease, it is likely to hasten the death of the animal; or if vaccine is injected into an exposed animal, the animal is more likely to contract the disease during the negative phase.

Work with living sensitized vaccines in typhoid has not shown that this method is preferable to the ordinary method. Before living germs are used generally, we must have more evidence to show that danger of making typhoid carriers does not exist.

As bacteria sensitized by the serum of immunized horses are as potent in their ability to sensitize the persons injected to horse serum as is horse serum alone, it would appear advisable to use the serum of some other immunized animal.

While for some infections sensitized vaccines will still be found best, yet for the treatment of mild staphylococcus infections, and for immunization against typhoid fever and cholera, except during epidemics, Wright's method is satisfactory.

Autoserotherapy.

The chief point in favor of autoserotherapy is that the bacteriological diagnosis is made automatically. Since the work of Debove and Raymond in 1891, autoserotherapeutic methods have been used for the treatment of many conditions, with varying results. With proper bacteriological control, the method has much to recommend it, but in practice there is much careless and faulty technique which must be condemned. Specimens must be collected with every possible care into properly sterilized vessels, and the filtrates made immediately, so that no opportunity is given bacteria having no relation to the infection time to develop and possibly to elaborate harmful toxins. Filtrates from an infection in any way connected with the intestinal canal are especially dangerous, on account of the possible presence of the tetanus bacillus. The filtrate should not be injected under any circumstance until the absence

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[3] C.-r. Acad. des Sci., 1902, vol. cxxxiv, p. 1330; Annales de l'Inst. Past., 1902, p. 918; Bull. de l'Inst. Past., 1910, p. 241; *Ibid.*, 1912, No. 12, pp. 529-540.

[4] Lancet, 1912, vol. ii, Aug. 24th, pp. 504-508.

or tetanus and other toxins has been demonstrated and until sterility has been ascertained by bacteriological control. Oral administration of filtrates or diluted pus is to be avoided. Closely related to the faulty autoserotherapeutic methods is the so-called short method for the preparation of autogenous vaccines by which bouillon or another fluid culture medium is inoculated with infectious material, incubated overnight, and used after no other treatment than shaking and heating to 60° for a short time. Such a procedure should be permitted only for cases demanding great haste which are caused by a single bacterial species.

That in autotherapy methods the vaccine may contain bacterial derivatives that would not be included in a vaccine prepared by the ordinary method cannot be denied.

Anaërobic Bacteria.

Undoubtedly some of the failures of vaccine therapy are due to the fact that the vaccine used does not represent all the bacteria responsible for the infection, and an important class of those commonly left out is the anaërobes. These are frequently found associated with aërobic micro-organisms, but they have been omitted in the preparation of vaccines because of the difficulty of isolation and of growing in sufficient bulk, and because it is commonly believed that anaërobic bacilli are nearly all sporogenic. As spores are not killed at 60°, the resultant suspension would be dangerous, while a temperature high enough to kill the spores would destroy the specific antigen. There is, moreover, a general ignorance concerning anaërobic bacteria and their relations to regional infections. Most of these difficulties may be overcome. Innumerable easy methods have been devised for growing anaërobic bacteria. Of the 93 species of anaërobic bacilli mentioned by Jungano and Distaso, 46 are non-sporogenic; 15 of the non-sporogenic anaërobes are virulent for laboratory animals and many have been isolated from regional infections. It is therefore to be hoped that future studies of mixed infections will take into account the anaërobic bacteria present.

Sporogenic Bacteria.

Systematic work upon the problem of obtaining antigenic substances from sporogenic bacteria is needed. The efforts that have been made so far to use various bacterial derivatives as vaccine may be utilized as a basis for such work.

Regional Infections.

Each exposed region of the body seems to offer soil peculiarly favorable to certain organisms. The number of species found in each locality is surprisingly small. Why in parts open to the invasion of many forms of bacterial life a few classes survive, while others fail to gain a foothold, is interesting matter for speculation. While ordinarily a balance of action probably exists between the bacteria and the tissue, so that neither disturbs the other, any disturbance of the equilibrium may allow the so-called normal bacteria

to acquire added virulence and to exert pathogenic activity. Vaccine treatment of such an infection is a problem because diagnosis is difficult, as it is not possible to select one of four or five different species and declare it the offending organism. Moreover, Allen has shown that the true infecting organism may escape detection upon the first examination. The bacterial flora may be added to at any minute, but the additions are limited in number and we know what they are likely to be. Treatment for one type does not preclude the possibility of subsequent infection by others.

The rational treatment of infections of exposed parts of the body requires the use of suspensions containing a mixture of all the germs taking part in the infection. An objection which has been made to the method is that the list of bacteria included would be too long, but it has been shown that the number of different kinds of bacteria is sufficiently small to make a mixed vaccine containing them all entirely practical. The objection that such a mixed vaccine would encourage the physician in the neglect of proper bacteriological diagnosis prompts the question of how many such diagnoses are made at the present time. It is believed that the contemplation of vaccine treatment will lead to a desire for greater accuracy of diagnosis. The fact must be emphasized that the type of infection to which the use of mixed vaccine is adapted is one in which a number of offending organisms take part, such as the common cold, and is not an infectious disease of definite etiology or symptomatology such as diphtheria or scarlet fever.[5]

The above does not excuse the mixture of various kinds of bacteria for the production of pan-immunity. There are definite reasons for the presence of each organism in the suspension.

Mixed vaccines containing the typhoid bacillus and the two paratyphoid bacilli, A and B, are entirely justified in immunization, as typhoid and paratyphoid fevers are so similar that immunization against the three infections at the same time is unquestionably a rational procedure. Such a mixed vaccine was first suggested by Castellani in 1902, and its use has been continued by others. Castellani demonstrated that upon inoculating an animal with two different bacteria at the same time the blood produced agglutinins and immune bodies for both, and that the amount of agglutinins and immune bodies was about the same as in animals inoculated with one germ only. To determine the antibody formation caused by mixed vaccines the author, in collaboration with Mr. George Hansen, studied the effects of single and mixed typhoid vaccines upon rabbits, and demonstrated that there was satisfactory antibody formation to each of the antigens, although there was slightly less

[5] To the objection that mixed vaccines are shot-gun prescriptions, we may answer that it is only with a vaccine made from a combination of bacteria that we can fight against a condition brought about by a number of invading organisms. In reply to the further objection that the cells locally will be overwhelmed by the great variety of antigens, so that the antibody formation for each will be much lower than when a single antigen is employed, we must emphasize the fact that we are merely trying to increase the resistance of the person treated, and we believe that some increase in resistance to all the infecting bacteria is preferable to high resistance to one.

typhoid agglutinin formation in the rabbits that received the mixture than in those that received typhoid vaccine alone.

A third purpose in the use of mixed vaccines is for immunization before operation. Here a mixed vaccine containing the bacterial species most likely to cause infection of the wound should be used. Before abdominal operations, especially if infection is present, a mixed vaccine similar to that suggested by Dr. Van Cott, of Brooklyn, is indicated, provided sufficient time is available for its use.

Finally, it is the opinion of the writer that the potentialities of vaccine therapy in typhoid fever will not have been exhausted until a mixed vaccine is used in treatment.

General Considerations.

Although the attempts of bacteriologists to obtain more efficient vaccines seem to imply that it is necessary to obtain a more efficient antigenic substance, a consideration of Wright's work suggests the possibility that efforts should be made in different channels. As Wright's work has demonstrated that bacterial vaccines will cause the formation of specific bacteriotropic substances, failures to cure disease do not rest upon the failure of the vaccine to cause the tissues to produce antibodies, but rather upon the power of pathogenic bacteria to reach the tissues under certain conditions and to resist the action of the normal antibacterial substances. They do this by chemical means—toxins and other products of bacterial growth—and by physical means —the pathological changes characteristic of the lesion. To overcome the chemical defense, antitoxins and antiserums have been devised. In the injection of vaccines, however, the chemical defense of the infecting agent interferes only slightly in the successful treatment of the disease.

To overcome the mechanical defenses, it is necessary, in the author's opinion, to study the relation of the infecting bacteria to the blood- and lymph-supply. The reason for failure in vaccine therapy is not that specific antibodies are not formed, but that they are not permitted to come into contact with the infecting bacteria. Wright, in a chapter in "Studies on Immunization,"[6] has pointed out a number of accessory methods by which the flow of blood to the infected part may be increased.

The author suggests that there may be materia medica preparations which, if properly used, would be of as much accessory value as the mechanical devices suggested by Wright. He asks if there are not drugs which will cause temporary flushing of the infected part, or will renew the blood locally in cases where it is stagnated, or will cause, at a time when the content of the blood in antibodies is greatest, a temporary local congestion resulting in a hypersecretion of mucus and outflow of lymph.

DISCUSSION.

Dr. Osborne inquired with regard to the value of stock antistreptococcic and antistaphylococcic vaccines in pneumonia and urethritis.

[6] New York, Wood, 1910, pp. 452-455.

Dr. F. E. Stewart, Philadelphia, suggested that some of the good results reported after antityphoid inoculation might be due, in part at least, to modern hygienic methods, screening from flies, etc.

Dr. Kinyoun said that he could not fully agree with Dr. Hitchens as to the use of mixed vaccines. His experience with them had been unsatisfactory. The best results were obtained from individual strains. The secret of success lay in determining the cause of infection in each case as nearly as possible, and then acting accordingly. There was no doubt but that a great advance had been made in the prevention of typhoid in the army by the introduction of antityphoid inoculation. Among the people at large, however, the reaction caused by the injections interfered with its usefulness. People were loath to submit to vaccination, and still more loath to submit to antityphoid inoculation, particularly after they had had one injection. Some way should be found to lessen the unpleasant effects of the first dose.

Dr. Hitchens said that, according to W. E. Robertson, who had had considerable experience in this line, the vaccines were of value in pneumonia. Not infrequently they failed, however, and it was impossible to predict when failure would occur. He had felt as Dr. Kinyoun did about the use of mixed vaccines until after he had had considerable experience with them, and he had waited before expressing his views until he had become convinced that his conclusions were fully justified by the results. A hodge-podge or shot-gun vaccine could not be condemned too severely; but in some cases of mixed infection the indications were clear, and mixed vaccines could be used to advantage.

Dr. Osborne asked Dr. Hitchens whether he had had any experience with antirheumatic vaccination.

Dr. Hitchens replied that he had had no personal experience with it. If, however, rheumatism was caused by a specific microbe and that microbe was employed in treatment, he believed that a clinical result could be obtained, provided that the antibodies came into contact with the infecting bacteria. Therein, however, lay the difficulty.

DIOXYDIAMIDOARSENOBENZENE-MONOMETHANE SODIUM SULPHONATE IN SYPHILIS OF THE NERVOUS SYSTEM.

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We have in this comparatively new remedy one of the most important aids to the treatment of syphilis of the nervous system, both in the early manifestation, *i.e.*, cerebrospinal syphilis, and in the so-called parasyphilitic affections, tabes and general paresis. With the control examinations of the blood and cerebrospinal fluid, we have in the use of this drug a rational method of therapy, the necessity of continuance of treatment, or its cessation, being indicated by the presence or absence of the Wassermann reaction.

With the discovery of the spirochetes in the brain and spinal fluid in tabes and general paralysis, the indication for the removal of this active agent of syphilis becomes mandatory. We should bear in mind, however, that after definite pathologic changes have taken place nothing can be accomplished beyond preventing further extension of the disease by the still active agent. Too much emphasis cannot be placed, therefore, on the importance of early diagnosis by careful serologic and clinical examination.

We have in the remedy under consideration one which, if employed at the proper time, can effect much in staying further progress of syphilitic disease of the nervous system, if not, indeed, in certain forms, produce a cure.

DISCUSSION.

Dr. J. J. Kinyoun said that during the last two and a half years he had examined a number of tuberculous patients for syphilis, and had found a strongly positive Wassermann reaction in about 30 per cent. of cases. He was still pursuing the investigation at a reformatory institution for boys. So far he had found a positive reaction in 23 per cent. of the boys examined,—boys between 12 and 18 years of age.

Dr. Fisher, in closing, said that the effect of the new remedy in neuritis had been rather favorable than otherwise. The Wassermann test was of great value in doubtful cases, such as those of hereditary syphilis, and where there was uncertainty as to the nature of a mental disease, *e.g.*, in some cases of general paresis. The use of a new remedy such as this, so easy of administration, was likely to be carried to extremes. It sometimes fell into wrong hands, and hopes of cure were engendered that were not to be fulfilled; on this account he thought it well to sound a note of warning as to the small proportion of cases in which a cure could be expected after a certain point had been reached.

COPPER CHEMOTHERAPY—WITH SPECIAL REFERENCE TO THE DOUBLE TARTRATE OF COPPER OXIDE AND SODIUM.

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Only one member of the heavy metal series has been extensively used up to the present time as an antiseptic in internal medicine, viz., silver. The soluble salts of this metal are, owing to their coagulating properties, unsuitable for hypodermic or intravenous injection, and to circumvent this difficulty solutions of various albuminates have been employed. For intravenous injection in the treatment of septicemia colloid silver (collargol) has been most used; but this compound is stated by Cushny to be absolutely inert and devoid of disinfectant action. In regard to all the various so-called organic combinations of silver such as the albuminate, there may be stated to be two objections to their use as internal (intravenous) antiseptics. The first is the fact that in order to eliminate the marked coagulating power of the silver ion, a considerable amount of albumin must be present in the compound, which, of course, reduces the antiseptic power proportionately. In the second place, the comparative toxicity of the silver ion is rather great, and there is always the possibility of argyriasis if the administration is repeated. Copper, on the other hand, is not nearly so toxic. It is still a disputed question as to whether there is such a thing as chronic copper poisoning in man, *i.e.*, from quantities of copper which may enter the blood from the food, as from vegetables colored with copper, from flour improved by copper, from cooking utensils, or from occupations. Copper is, indeed, a normal constituent of the blood in some invertebrate animals, apparently taking the place of and performing the same functions as the hemoglobin of vertebrates.

Added to its comparative lack of toxicity to man is the interesting fact that copper has an exceedingly powerful poisonous action upon lower forms of vegetable life. And this toxicity is remarkably selective; for instance, some of the lower plants, such as algæ, are killed by extreme dilutions (1 part in 1000 million). Yeast is inhibited by dilute solutions, but upon molds it has no detrimental effect; on the contrary, the growth of molds is stimulated. In this connection Cushny has said: "Copper thus seems to have a very powerful poisonous action on certain living forms and to be harmless to others, and the subject deserves further investigation. It is possible that it may prove to act prejudicially to some human parasites, and it is certainly less dangerous to man than many other remedies used as parasiticides and disinfectants." It does not appear far-fetched, therefore, to assume that copper will find a much

more important place in therapeutics than it occupies today, and it occurred to us that its effects, particularly upon the pus-producing organisms and the septicemias, were worthy of investigation.

The following report is a partial account of some investigations which we have carried out during the past year at the Georgetown Medical School and Hospital with a view of determining how far these suppositions in regard to the use of copper as an internal antiseptic might be justified. It is to be regretted that the results of these researches are not more productive and complete, but even as they are they show perhaps one thing at least, and that is a justification for further researches which we are carrying on at the present time. I take this opportunity of expressing my appreciation for the invariably generous assistance of my colleagues, particularly Prof. Hird, of the chemical department; Prof. Behrend and his clinical laboratory staff, especially Dr. McNamee and Mr. Neuman, and of our devoted Dean, Dr. Kober, who generously provided whatever material aid was necessary.

The results of our experimental work may be considered under the following headings: 1. Chemical and Pharmacological. 2. Bacteriological and Therapeutic. 3. Summary and Conclusions.

I. Chemical and Pharmacological Considerations of the Copper Ion with Special Reference to the Double Tartrate of Copper Oxide and Sodium.

The soluble salts of copper obey the general rule of the heavy metals in precipitating proteids from solution. The inorganic acid salts of the metal possess this power in a high degree, while the salts formed from the organic acids are also proteid precipitants, but less active in this respect. Many experiments were made to determine the quantitative aspects of this relation, and it was hoped that an organic acid salt might be found in which the proteid-precipitating power might be reduced to a practicable minimum. The inorganic acid salts of copper were found to precipitate egg albumin in physiological salt solution in dilutions of 1: 50,000 in some instances.

The following inorganic salts were made in the laboratory and tested in the same way: the formate, acetate, propionate, oxalate, succinate, alpha-hydroxypropionate (lactate), oxysuccinate, malate, tartrate, benzoate, ortho-amidobenzoate (anthranilate), benzoylamidoacetate (hippurate), phthalate, orthohydroxybenzoate (salicylate), gallate, tannate, cinnamate, and urate. These salts were made by adding to hot aqueous solutions of the acid freshly precipitated washed copper oxide until no more dissolved, filtering, and evaporating the filtrate to crystallization. Repeated crystallization was performed until the pure salt was obtained.

The organic acid salt, when soluble, was dissolved in distilled water in the strength of 1 per cent., and tested upon solutions of egg albumin in physiological salt solution. While precipitation did not occur as readily with these salts as with the inorganic, nevertheless this proteid-precipitating power was considerable, appearing in several instances in a dilution of 1: 5000. This power of precipitating proteids possessed by all the copper salts, with both organic and in-

organic acids, eliminated the possibility of their use for pharmacological and therapeutic experimentation.

There are, however, two well-known methods by which the objection of proteid precipitation may be eliminated: First, by the formation of a double salt, and, second, by the preformation of an albuminate. The best known of the double salts of copper is the double tartrate of copper oxide and sodium. To make this compound, Harnack recommended the following procedure[1]:— A solution of copper sulphate is completely precipitated with NaOH. The precipitate is dissolved in tartaric acid, and sodium hydroxide then added until the fluid is neutral. Albumin is not precipitated by this solution unless acid is in excess. Klemptner, in studying the effects of copper upon the animal organism, made the double salt in the following way: To a solution of copper sulphate, sodium tartrate is added. The double tartrate of copper oxide and sodium is precipitated. This is washed on a filter until the filtrate shows no reaction with barium chloride (absence of sulphate). Sodium hydroxide is carefully added until the precipitate is dissolved and the reaction is neutral or slightly alkaline. The solution is then diluted with water in the proportion of 1 part of solution to distilled water, enough to make 10 parts.

In our investigation the double salt was made according to Klemptner's method. The resulting fluid is dark blue in color, with a specific gravity of 1021. Its exact neutrality was determined by titration with phenolphthalein. The quantitative determination of the amount of copper oxide present in the solution was done by electrolysis in a platinum crucible; 2 c.c. of the diluted solution was put in the tared crucible with immersed platinum electrode. The 110-volt direct current was passed until all the copper had become deposited as metal on the crucible. This was carefully dried and weighed. For example, in one instance the original weight of the crucible was 31.1035 Gm. Weight after electrolysis, 31.1120 Gm. Difference, representing weight of copper as metal, 0.0085 Gm. Calculated as CuO on the basis of formulæ: 63 (atomic weight of Cu) is to 79 (molecular weight of CuO) as 8.5 is to x. X equals 10.6 mg. CuO in 2 c.c. of solution, or 5.3 mg. of CuO in 1 c.c. of solution. Klemptner arrived at a quantitative estimation of the amount of CuO present in his solution by means of a chemical reduction operation.

The solution of the double salt prepared as above does not precipitate proteids in any concentration, either of egg-albumin solution or of blood-serum. But in mixtures of diluted human blood, as observed by me, and of dog's blood, as observed by Klemptner, after some hours the corpuscles turn brownish red and settle to the bottom of the tube, leaving supernatant the clear-blue solution. This only occurs when the undiluted copper solution is added to the blood. Klemptner was of the opinion that a definite chemical compound of copper and hemoglobin is thus obtained, and suggested that a quantitative estimation of the amount of hemoglobin might be made by using solutions of known copper strength. He regarded the copper-hemoglobin combination as similar to the zinc-hemoglobin combination previously described by Kobert.

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[1] Arch. f. exper. Pathol. u. Pharm., 1874-75, iii, 44.

Although experiments to determine the toxicity of the double tartrate of copper oxide and sodium solution in terms of CuO had been made by both Harnack and Klemptner, it was deemed advisable to repeat these observations before attempting to apply the drug therapeutically, even in animals, because of the necessity of eliminating all possibilities of complicating results by the production of toxic phenomena, and especially to aid in the calculation of the therapeutic dose. The undiluted solution, even in comparatively small quantities, was found extremely toxic to frogs, as the following protocols of experiments will show:—

1. Spotted frog, weight 40 Gm.; 0.5 c.c. of the solution of copper oxide sodium tartrate (2.2 mg. CuO) injected into anterior lymph-sac at 3 P.M. 3.30 P.M., respiration feeble; great depression; muscular twitching, especially of gastrocnemii; eyes closing. 3.45 P.M., respiration almost imperceptible; slight muscular twitching of thigh; death. Autopsy shows auricular cavities distended and dark, and ventricle paralyzed in diastole.

2. Spotted frog, weight 29 Gm.; 0.5 c.c. of the solution of copper oxide sodium tartrate (2.2 mg. CuO) injected into anterior lymph-sac at 2 P.M. 2.10 P.M., retraction of head; depression, respiration feeble. 2.20 P.M., eyes closed; respiration stopped. 2.30 P.M., death. Autopsy showed that copper solution had to some extent entered the peritoneal cavity. Heart distended.

To arrive at the minimum fatal dose for frogs the solution was injected in extreme dilution, and the quantity of copper gradually increased. The results are shown in the following table. In each case spotted frogs were used (month of August), and the injection was made into the anterior lymph-sac. The quantity of fluid injected in each case was 0.5 c.c.:—

TABLE SHOWING MINIMUM FATAL DOSE IN FROGS.

	Weight in Gms.	Dilution.	Calculated amt. of CuO.	Result.
I.	31	1 to 400	0.0066 mg.	No symptoms.
II.	31	1 to 300	0.0088 mg.	No symptoms.
III.	37	1 to 250	0.010 mg.	No symptoms.
IV.	35	1 to 200	0.013 mg.	No symptoms.
V.	35	1 to 150	0.017 mg.	No symptoms.
VI.	31	1 to 100	0.021 mg.	No symptoms.
VII.	31	1 to 50	0.05 mg.	No symptoms.
VIII.	37	1 to 25	0.10 mg.	Not active the next day.
IX.	35	1 to 10	0.21 mg.	Next day sluggish; skin dark colored.
X.	30	1 to 5	0.53 mg.	Died following night; skin dark green.
XI.	30	1 to 3	0.89 mg.	Died; skin almost black; tissues swollen and dark; heart distended.
XII.	39	1 to 2	1.3 mg.	Died; dark fluid in lymph-sac; abdominal muscles dark; fluid in peritoneum; auricles distended and black.

It will be seen from the table that the minimum fatal dose of the solution for frogs in terms of copper oxide is 0.5 mg. This result corresponds ex-

actly with that obtained by Harnack, who found that in frogs 0.5 to 0.75 mg. produced complete muscular paralysis in several hours, and that 3 mg. produced cardiac arrest in one hour, preceded by muscular twitchings. Klemptner, in his experiments on the toxicity of his solution, did not work with frogs.

Toxicity in Mammals.—Harnack found that in rabbits 0.5 Gm. given subcutaneously was lethal. My own results with rabbits indicate a somewhat higher toxicity, as is shown by the following experiments:—

1. Gray rabbit, weight 1 kilogram. Injected hypodermically 1 c.c. of a solution of double tartrate of copper oxide and sodium diluted, equal parts, with salt solution. This represented 5.3 mg. CuO. The animal recovered, and, beyond a slight diarrhea, showed no symptoms.

2. Gray rabbit, weight 1.5 kilograms. Injected 2 c.c. of copper solution diluted with equal parts of salt solution. This represented 10.6 mg. of CuO. The animal recovered.

3. Gray rabbit, weight 1 kilogram. Injected hypodermically 3 c.c. of copper solution diluted with equal parts of salt solution. This represented 15.9 mg. CuO. The animal became depressed, with feeble pulse and respiration, and partial paralysis of voluntary muscles. The animal died in twenty hours. Autopsy findings substantially as in Case 4.

4. Black rabbit, weight 1.5 kilograms. Injected subcutaneously 4 c.c. of copper solution, diluted with salt solution, representing 21.2 mg. of CuO. Muscular twitching and depression followed, with complete paralysis of voluntary muscles, the animal lying flat, with weak heart and respiration and dilated pupils. Sensibility unaffected. The animal died the following night. Autopsy showed chocolate-colored subcutaneous ecchymoses in lumboabdominal region, where the injection was given. Subcutaneous tissue of abdomen edematous. Peritoneal cavity filled with fluid, and pleura edematous. Right auricle and ventricle distended with dark, clotted blood. Liver dark and hemorrhagic. Blood in the veins clotted solid. Stomach distended with food and colon with feces. Spleen and pancreas apparently normal. Kidneys hemorrhagic.

It will thus be seen that the minimum lethal dose for rabbits of the solution, calculated in terms of copper oxide, is 0.0159 Gm., or 15.9 mg., which represents about three times the degree of toxicity observed by Harnack. An average lethal dose of 15.9 mg. for a rabbit weighing 1 kg. corresponds somewhat closely to the results obtained by Klemptner in the cat. He injected intravenously a cat weighing 2550 Gm. with a quantity of solution corresponding to 15.2 mg. of CuO, diluted with salt solution so that each cubic centimeter contained 0.7 mg. of CuO. The pulse and respiration became irregular and accelerated, muscular paralysis followed, with diarrhea, unreacting pupils, coma, and death. It must be remarked that, of course, in this experiment of Klemptner the injection was made intravenously, which would tend to lessen the size of the fatal dose; but it must also be noticed that the solution was given highly diluted in salt solution, which would tend to increase the dose which could be given before a fatal result occurred.

We did not perform any toxicity experiments upon dogs. In comparing the results of work done on this animal by Harnack and Klemptner, we find that the former gives the fatal subcutaneous dose as 0.4 Gm. CuO, while the latter gives the fatal intravenous dose as 0.02 Gm. for a dog weighing 3 kg. It is therefore probable that the minimum fatal dose for dogs lies somewhere between these extremes, possibly in the neighborhood of 0.15 Gm. of CuO.

From the results of our experiments, and those of Harnack and Klemptner, it may be stated as probable that the copper double salts primarily stimulate and subsequently paralyze the peripheral terminations of motor nerves, involuntary muscles, and heart muscle; that copper in this form has no effect upon blood-serum, but combines more or less firmly with the hemoglobin of the red corpuscles, and that death is due to a combination of these effects. Curci, an Italian observer, is of the opinion, however, that the effects noted from the double salt are due to an ascending paralysis of the central nervous system. This view is contrary to the generally accepted opinion.

Copper Albuminate.—This compound has been studied pharmacologically by Schwarz, who made copper albuminate by a method similar to that previously proposed by Schmiedeberg and Marfori for making albuminate of iron. The method is as follows: From a solution of alkali albuminate the proteid is precipitated as acid albumin by means of acetic acid. This is again dissolved by means of sodium hydroxide, and a solution of copper acetate added. The result is an alkaline solution of copper albuminate which is deep violet blue in color. This is heated for a day on the water bath. After cooling, the copper combination is precipitated with acetic acid, filtered, and washed as long as the filtrate shows copper reaction (H_2S or potassium sulphocyanide). The precipitate is finally brought into neutral solution by careful addition of sodium hydroxide. The compound cannot be made to contain more than 6 per cent. of CuO. Schwarz made use of a solution containing 0.005 Gm. of CuO to every cubic centimeter of solution. He found by experiments upon frogs and rabbits that the symptom-complex of acute poisoning is completely analogous to that found after the use of the solution of the double tartrate (copper oxide sodium tartrate). According to Schwarz, however, the lower threshold of poisonous dosage is higher in frogs than with the double salt. He found the minimum lethal dose for rabbits the same as that found by Harnack for the double salt.

In both frogs and rabbits the symptoms came on more slowly than Harnack had found to be the case with the double salt. For example, as has been mentioned previously, Harnack found that in frogs 0.5 to 0.75 mg. of CuO in the form of the double salt produced paralysis in a few hours, and this corresponds to our own findings; but Schwarz found copper albuminate began to be toxic to frogs only when the dose reached 2 to 3 mg. of CuO, and then the first signs of paresis became manifest only after eight to ten hours. Death did not occur for two or three days after such doses. Again, in rabbits, while Harnack found doses of the double salt corresponding to 0.05 Gm. of CuO subcutaneously were fatal in some hours, the same results were produced with the albuminate in similar dose only after several days. This Schwarz attributed to the more gradual decomposition of the albuminate. In the foreground of the phenomena seen by Schwarz was always fibrillary twitching, followed by paralysis of voluntary muscle. He also noted diarrhea as a constant symptom. Although we made copper albuminate according to the method recommended by Schwarz, we did not undertake any experiments to determine its toxicity or pharmacodynamic action, since there did not appear to be any manifest advan-

tages of the albuminate over the solution of the double salt for the purposes intended.

II. Bacteriological and Therapeutic Considerations of the Copper Ion, with Special Reference to its Presence in the Double Tartrate of Copper Oxide and Sodium.

Many of the salts of copper have been carefully examined in respect to their antiseptic power. Green studied the action of the chloride, acetate, nitrate and phenolsulphonate (sulphocarbolate), and concluded that the soluble copper salts, especially the chloride, are endowed with considerable disinfecting power. He recommends the use of copper chloride solution for purposes of wound disinfection. Gildersleeve investigated the bactericidal action of copper on organisms in water. He found that dilute solutions of copper have a marked destructive action on many bacteria. Of the salts, he found the sulphate most active, which he attributed to its undergoing electrolytic dissociation most readily. The amount of sulphate necessary was very small, 1 to 250,000 to 1 to 100,000. Green studied the action of so-called colloidal copper obtained by allowing water to stand in polished copper vessels. Stewart, in a study of the action of colloidal solutions of copper upon *Bacillus typhosus,* concluded that water containing colloidal copper has a rapid toxic action upon this organism. He calculated that the amount of copper given off in a 1-liter copper vessel in three hours is 1 in 4,000,000, and yet in this extreme dilution typhoid bacilli were destroyed in one or two hours. The work of Moore and Kellerman is also important in this regard, and tends to substantiate the findings of the investigators above mentioned.

Investigations have shown, therefore, that the inorganic salts of copper and the so-called colloidal solutions of this metal are endowed with a very considerable germicidal power. Inasmuch as there is no reference in the literature to any determination of the antiseptic power of the double salt (double tartrate of copper oxide and sodium), it was deemed advisable to undertake some experiments in this regard. Observations were made upon fermentation of milk, urine (normal and diabetic), putrefaction of protein solutions, and cultures of *Staphylococcus pyogenes aureus.*

Added to fresh normal urine in the proportion of 1 c.c. of solution of the double salt (5.3 mg. CuO) to 50 c.c. of urine, the salt was found to delay alkaline fermentation, no ammoniacal odor developing in the urine for a week, while the controls developed a strong ammoniacal odor before that time. While this was the case with reference to fermentation, a curious fact was noted, viz., that in every case a profuse growth of mold appeared on the urine containing the copper solution, while none appeared on the controls. This was especially the case with diabetic urine, where the growth was extremely luxuriant in four or five days. In flasks containing urine, 50 c.c., to which 2 c.c. of copper solution (10.6 mg. of CuO) had been added, the phenomena with reference to putrefaction were the same, but the development of mold growth was partly inhibited.

Following are a few brief protocols of experiments carried out on urine:—

No. I.—Sept. 11. Fifty c.c. of fresh urine, acid, sp. gr. 1018, exposed in an open flask. 2 c.c. copper solution (10.6 mg. CuO) added. Same quantity of urine placed in second flask as control.

Sept. 12. Fungous growth around margin of surface; thick white sediment at bottom; odor slightly urinous. Control clear; odor slightly urinous; no mold.

Sept. 14. Mold appearing on surface. None on control.

Sept. 17. Aromatic, moldy odor; mold growing over surface in round colonies. Control has an ammoniacal odor.

No. II.—Sept. 12. Fifty c.c. of normal urine, plus 2 c.c. of copper solution, placed in an open flask.

Sept. 15. No ammoniacal odor; dark mold around margin of surface. Control strongly ammoniacal.

Sept. 19. No ammoniacal odor. Control very strongly ammoniacal.

No. III.—Sept. 12. Fifty c.c. of diabetic urine, plus 1 c.c. copper solution exposed in an open beaker.

Sept. 15. Mold on surface; heavy precipitate. Control negative.

Sept. 17. Brown color; thick, puffy layer of mold over surface. Control reddish brown, free of mold, and with a strong odor.

Added to fresh milk in a sterilized flask, in the proportion of 1 c.c. of solution of the double salt (5.3 mg. CuO) to 50 c.c. of milk, copper was found to inhibit lactic acid fermentation and coagulation for days, while the controls were firmly coagulated and of sour odor. Two experiments may be cited:—

No. I.—Sept. 11. Fifty c.c. of fresh milk placed in a stoppered sterilized flask, plus 1 c.c. of copper solution.

Sept. 12. Slight curd; odor sweet. Control thickly curdled and of sour smell.

No. II.—Sept. 18. Fifty c.c. of fresh milk, plus 2 c.c. copper solution, placed in an open flask.

Sept. 20. Liquid and odorless. Control coagulated and of sour odor.

Sept. 21. Liquid and odorless. Control solidly coagulated and serum separated, with strong, sour odor.

When copper was added to ordinary bouillon, in the proportion of 1 c.c. of solution of the double salt (5.3 mg. of CuO) to 50 c.c. of the proteid solution, putrefaction was inhibited.

Bacteriological Tests.—These were made with pure cultures of *Staphylococcus pyogenes aureus*. Tubes of glucose-agar were inoculated by both stabs and slant smears. To test-tubes half-filled with culture medium 1 c.c. of the copper solution (5.3 mg. CuO) was added, and these were inoculated from pure cultures of *Staphylococcus pyogenes aureus*. Controls were simultaneously made, that is, tubes were inoculated minus the copper solution. After forty-eight hours' incubation no growth was visible in the tubes treated with the copper solution, while in the controls abundant cultures of the yellow staphylococcus were obtained, especially on the slants. Later, however, the curious phenomenon of stimulation of growth was observed, for in the tubes to which copper solution had been added, although no growth of staphylococcus was visible, a luxuriant white growth appeared. Examination of this organism showed it to be very motile, and it was soon identified as a contami-

nation from tap water which had been used in mixing drops from the cultures of staphylococcus in the experiments. Another series of experiments was undertaken minus the tap water. To test-tubes half-filled (50 Gm.) with culture medium (glucose-agar) 1 c.c. of the copper solution (5.3 mg. CuO) was added, and these, after slanting, were inoculated from pure cultures of *Staphylococcus pyogenes aureus*. Controls were simultaneously made. After forty-eight hours' incubation no growth was visible in the tubes treated with copper solution, while the controls showed abundant growth of the yellow staphylococcus. With this technique no growth whatever appeared upon the media to which copper solution had been added. The strength of copper oxide present in the tubes containing 1 c.c. of the copper solution was estimated at 1 to 50,000.

Further experiments were made, using progressively weaker dilutions. 0.5 c.c. of copper solution (2.65 mg. CuO), added to tubes half-filled (50 Gm.) with glucose-agar media, prevented all growth. This corresponded to a strength of 1 to 200,000. 0.25 c.c. of copper solution likewise prevented all growth of staphylococcus, corresponding to a strength of CuO of 1 in 500,000.

Experimental Therapeutics.—This portion of our experimental work is as yet incomplete, but enough has been obtained in the way of results to encourage the pursuit of further work in this direction. Tests were made first upon experimental pneumococcic peritonitis in rabbits. Following is the protocol of an experiment:—

Exp.—Two rabbits were taken, each weighing 1.5 kilograms. Sputum from 15 persons was collected in a sterilized dish and thoroughly mixed. 1.5 c.c. of this mixed sputum was injected into the peritoneal cavity of rabbit No. 1 at 2 P.M. An equal quantity (1.5 c.c.) of sputum with which 1 c.c. of the solution of copper salt (5.3 mg. CuO) had been thoroughly mixed was immediately injected into the peritoneal cavity of rabbit No. 2.

Rabbit No. 1 became immediately depressed, with extremely rapid respirations, dilated pupils, and some ataxia. At 8 P.M. the same day the respirations had become slower. The animal was disinclined to move, and its head was tremulous. At 7 A.M. the next morning rabbit No. 1 seemed drowsy, and at 11 A.M. died. Rabbit No. 2 immediately after the injection was not much depressed, but the respirations increased in frequency, not, however, to anything like the same extent as in control No. 1. At 8 P.M. the same day the animal appeared normal, and the next day at 11 A.M. (at which time rabbit No. 1 died) the animal which had received the sputum mixed with the copper solution was normal.

Autopsy on rabbit No. 1 showed the abdomen distended. The peritoneum was injected; the colon was swollen, dark, petechial, deeply injected, and covered with lymph. The lymph exudation was quite extensive, involving the parietal peritoneum, which was inflamed. The liver was dark and hemorrhagic. The kidneys were injected and ecchymotic. A considerable quantity of dark-brown fluid was found in the peritoneal cavity. Cultures were made from both the fluid and exudate on bouillon and agar. These developed pure cultures of pneumococcus. Smears from both the fluid and exudate stained with carbol-fuchsin showed that the only organism present was the pneumococcus.

To determine whether the injection of a calculated therapeutic dose of the solution would have any deleterious effects upon the healthy animal the following experiment was performed:—

Exp.—A rabbit weighing 1 kilogram was taken. 0.25 c.c. of the copper solution, representing 1.3 mg. of CuO, plus 0.75 c.c. of normal salt solution, was injected into the marginal vein of the ear. There was no reaction and no symptoms were manifest. The next day the animal's blood was examined. The erythrocytes were normal. There was no crenation, vacuolation, or granular degeneration, nor any sign of hemolysis. The same experiment was repeated in another rabbit, using 0.5 c.c. of the solution, representing 2.6 mg. of CuO, plus 1 c.c. of salt solution. The results were entirely negative.

An attempt was then made to determine the effect of the copper solution upon an experimental staphylococcemia in a rabbit:—

Exp.—A young rabbit weighing 750 grams was used.

Nov. 12. 0.5 c.c. of an emulsion made from a pure culture of *Staphylococcus pyogenes aureus* was injected into the marginal vein of the ear.

Nov. 14. The animal shows loss of appetite and lessened activity. Could not stand well. Temperature 103° F. Probably developing joint infection.

Nov. 15. Total anorexia. Respiration very rapid. Animal very sick, and seemingly moribund. Temperature 105° F. In the afternoon 0.5 c.c. of copper solution, representing 5.3 mg. CuO, plus salt solution, was injected into the marginal vein of the ear.

Nov. 16. Slight appetite. Respiration not so rapid. Animal more active and resists when handled. Temperature 102.5° F.

Nov. 17. Animal much improved. Recovery ensued.

The virulence of the infection in the above case seems to be shown by the onset of symptoms indicating a septicemia.

We have also tested the solution of double tartrate of copper oxide and sodium from a therapeutic standpoint in the out-patient department of the hospital in a variety of pyogenic infections. The details of these investigations may be subsequently reported.

The results obtained in the external use of the drug, while they have been by no means disappointing, have not been brilliant. It is a well-known fact that pyogenic infections involving the skin are resistant to antiseptic treatment of any kind because of the simple fact that the organisms are protected in such a way that the necessary propinquity between germ and destroyer cannot be secured.

III. Summary of Conclusions.

The above investigations are, it is true, incomplete; but they appear susceptible of the following conclusions:—

I. The only compound of copper at present available for intravenous injection is a double salt such as the double tartrate of copper oxide and sodium. This compound does not precipitate proteid, and though the affinity of copper for hemoglobin in concentrated solution is such that it combines with the red corpuscles in the test-tube, this does not seem to occur to an appreciable extent when the copper salt is diluted with salt solution and injected into the veins.

II. The minimum fatal dose of the double salt in terms of CuO is as follows: For frogs (30 Gm.), 0.0005 Gm. For rabbits (1 kilogram), 0.0159 Gm. For dogs (3 kilograms), 0.15 Gm.

III. The chief pharmacodynamic effects of poisonous doses of copper administered as double salt are primary stimulation and subsequent paralysis of the peripheral terminations of motor nerves, involuntary muscles, and heart muscle.

IV. The solution of the double salt is powerfully antiseptic. It delays alkaline fermentation and putrefaction of urine, inhibits lactic acid fermentation and coagulation of milk, and putrefaction of proteids. It prevents the growth of *Staphylococcus pyogenes aureus* in the strength of 1 to 500,000.

V. A quantity of the solution corresponding to 0.0053 Gm. of CuO prevents the development of an otherwise fatal pneumococcic peritonitis in rabbits. A like quantity will arrest staphylococcemia in the rabbit.

VI. One-half c.c. of the solution of the double salt, representing 0.0026 Gm. of CuO, can be injected intravenously in a rabbit of 2 pounds' weight without the slightest subjective or objective symptoms. Therefore, in an adult human being weighing 140 pounds it should be feasible to inject 30 c.c. of the solution, representing 0.16 Gm. of CuO, without producing symptoms. This is only a theoretical margin of safety, however, and if its practical application to human medicine were ever attempted it would be proper to use a smaller dose. (One intravenous injection has been made by us in man up to the present time, in a case seen in the service of Professor Vaughan; 10 c.c. of the solution, representing 0.053 Gm. of CuO, well diluted with salt solution, were injected into the elbow vein. The injection was without any deleterious effect upon the blood.)

VII. The chief objection to the method in its application to practical work resides in the following facts: The double tartrate of copper oxide and sodium is not a perfectly stable compound, exists only in solution, and cannot be isolated as a salt. Being unstable and of uncertain chemical composition, the solution must be freshly prepared and specially titrated before use. This is a great practical disadvantage, and may probably prevent application of the method at present, to any extent at least, in human medicine.

It follows, we believe, without further amplification, that the method here presented is not claimed to be perfectly adapted to human application. Our chief desire has been (1) to emphasize the possibilities which inherently reside in copper chemotherapy; (2) to show that the theoretical considerations are to a great extent justified by the behavior of the copper ion, as present in the solution of a double salt, in our experimental investigation.

We must leave to the future the perfection of a method. If copper behaved chemically as does arsenic, for example, such a consummation could be rapidly evolved. Unfortunately, it does not so behave. Nor are we much better off in respect to the use of an albuminate of the metal, since up to the present time it has been found impossible to make a fixed proteid compound of copper containing more than 6 per cent. of the metal. However, we shall not abandon hope, since the facts, supported by both theoretical and practical considerations, all point to the copper ion as one from which more is to be expected in internal medicine in the future than has been secured from it in the past.

THE APPLICATION OF SOME MUSCULAR TISSUES ADAPTED TO PHYSIOLOGICAL STANDARDIZATION.

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The object of this paper is to place before the Society data regarding the standardization of certain drugs and galenical preparations by measuring their physiological action upon non-striated muscular tissue. The muscular tissue of uteri taken from non-pregnant guinea-pigs was used in these experiments, and fluidextract of ergot was employed. It was our purpose to extend these experiments to muscular tissue obtained from other parts of the body and from other animals, as well as to use other drugs, but time did not permit. We are therefore submitting this as a preliminary report and propose to continue our investigations for another year.

It is, of course, well known to the profession that non-striated muscular tissue exhibits automatic (spontaneous) rhythmic contractions. It is also well known that certain drugs have the power of stimulating the normal muscular movements. Experiments have been made by competent pharmacologists to utilize these facts in the standardization of ergot, pituitary extract, and other drugs of this class. Various forms of apparatus have been used for the purpose, and intact or isolated muscular tissue employed.

Our work has been limited to experiments upon the isolated uteri of guinea-pigs. Non-concordant results obtained by other workers with isolated uteri have been ascribed to the interference of spontaneous contractions and the increasing irritability of the muscle tissue under the continued influence of the drug. They have been endeavoring to overcome these objections by selecting the uteri of animals manifesting the least degree of these normal movements, preferably those of the cat. To illustrate: Edmunds and Hale, in reporting their observations upon the non-pregnant uteri of cats, state in Bulletin No. 76, Hyg. Lab., U. S. Public Health and Marine Hospital Service, Washington: "It is true that the uteri of young cats which may be perfectly quiet in the earlier stages of an experiment after some time may begin to contract spontaneously and increase the difficulty of making comparisons of the effects from successive injections of the drug." In such cases, the authors say "it may be

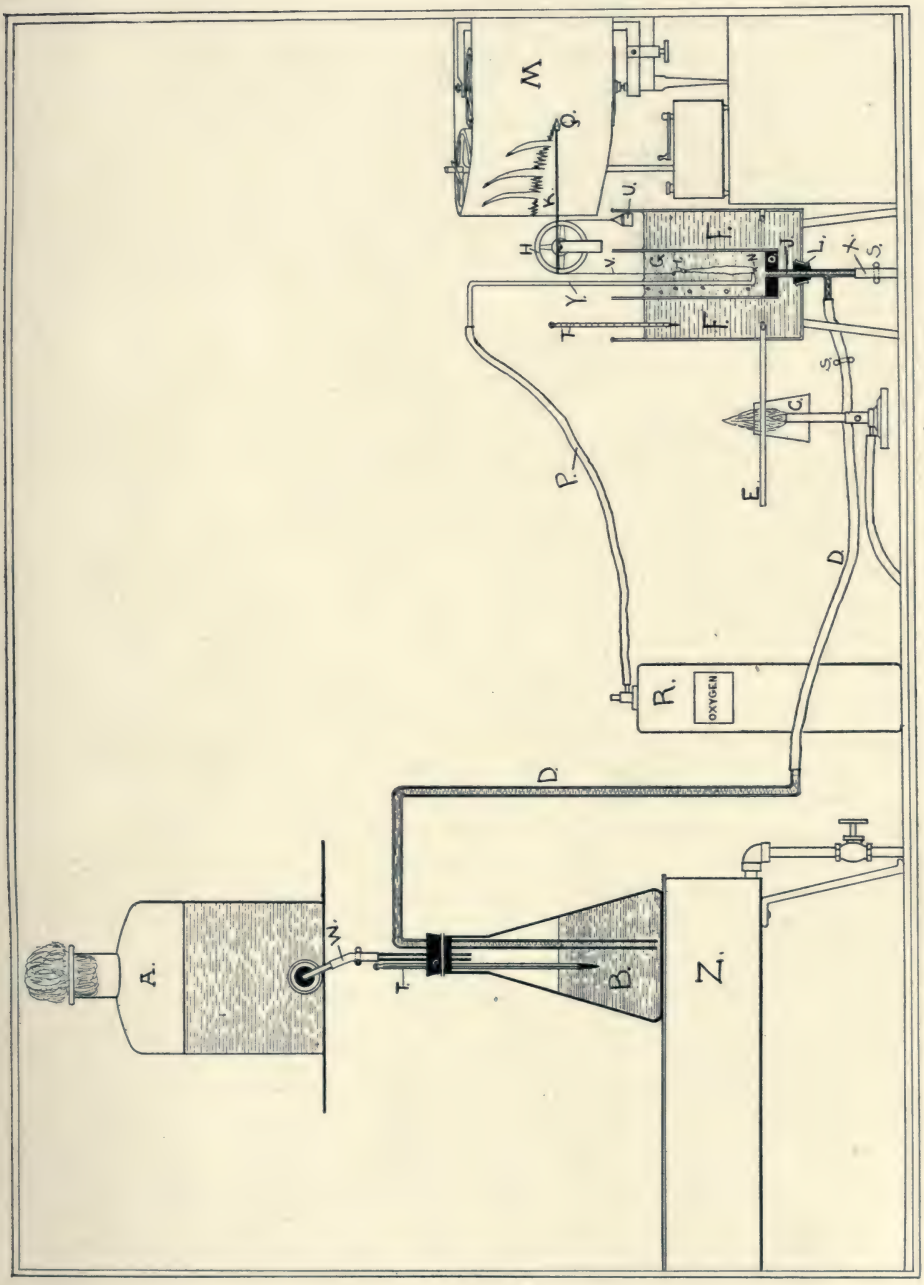


Fig. 1.—A graphic illustration of apparatus employed in our experiments upon isolated uteri.

necessary to employ as a standard the smallest amount which will clearly influence these movements, as, for example, by delay in the relaxation."

The uteri best adapted to our method, on the contrary, are those which manifest *the highest* degree of normal spontaneous movements. By weighting the uterus down, and thus reducing the amplitude of these movements, they can be controlled and measured. In our experiments the uterus is suspended in about 250 c.c. of Ringer's solution contained in a cylindrical glass vessel (Fig. 1, *G*) the lower end of which is plugged with a rubber stopper (*O*) having a central bore. Through the latter passes one arm of a wide glass "T" tube (*J*) which ends flush with the upper surface of the stopper, so that the cylindrical vessel may be completely emptied. This tube passes through a second rubber stopper (*L*) which fills an opening in the bottom of an outer metallic vessel (*F*) which forms a constant temperature water jacket. The temperature of the water in this jacket is kept constant by means of a metallic rod (*E*) which penetrates the wall of the jacket and passes through the water and is soldered to the opposite side of the jacket. The portion of the rod external to the jacket is heated by a protected Bunsen burner (*C*) which slides on the rod. The temperature is regulated by sliding this burner backward and forward until that point is found where the amount of heat transmitted by the rod to the water inside is sufficient to keep the thermometer (*T*) suspended in the water at the proper degree (38° to 39° C.). One of the other arms of the "T" tube is connected by a rubber junction (*X*) armed with spring clamps (*S*) to a waste pipe, by which the cylindrical glass vessel may be emptied. The remaining arm is connected by a siphon tube (*D*) to a flask (*B*) which holds a small amount of Ringer's solution for refilling the cylindrical vessel. This flask is kept at a temperature between 40° C. and 45° C. by means of a steam bath (*Z*).

The main supply of Ringer's solution is contained in a large aspirator bottle (*A*) connected with the small flask by a rubber tube (*W*), the object being to avoid exposing the reserve solution to prolonged heat. Heat causes Ringer's solution gradually to decompose and lose CO_2. The Ringer solution in the small flask should be reduced to 39° C. immediately before admitting it to the cylindrical vessel by allowing sufficient cold solution to run into it from the aspirator bottle.

Into the cylindrical vessel containing the Ringer solution dips a narrow glass tube (*Y*). This tube is turned at a right angle about half an inch from its lower end. Into this end is inserted a platinum pin (*N*) for attaching the *lower end of the isolated uterus*. The upper end of the tube is connected by means of rubber tubing to an oxygen reservoir. A constant stream of oxygen is allowed to bubble through a small vent situated at the lower bend of the tube, thus preserving the muscular irritability of the uterus and at the same time stirring the Ringer solution in the cylindrical vessel.

The *other end of the uterus* is fastened to a small platinum hook (*I*) connected to a silk thread (*V*) which passes over an escapement wheel and is attached to a pin on the opposite side of the wheel (*H*). A counterpoise bucket for holding shot (*U*) is attached to the other side of the wheel. To this wheel is soldered a stylet of aluminum, the axle of the wheel serving as a fulcrum.

To the end of this stylet a pen point is fixed for recording the contractions of the uterus on the revolving drum of the kymograph. The terms "no weights" and "weights added" used in this paper refer to the shot used in inhibiting the normal contractions of the uterus,—not to the counterpoise employed to keep the uterus suspended in the Ringer solution.

METHOD OF PROCEDURE.—The animal is killed, the uterus removed, and one horn is taken for operating the apparatus. This horn is quickly transferred to the Ringer solution in the cylindrical vessel and attached to the two platinum pins above referred to. The manipulation and exposure followed by the immersion in the warm solution will almost invariably produce a high degree of tonus, which gradually diminishes until the uterus returns to its normal condition. The weights are now added by dropping shot into the bucket until the uterus can make only small rhythmic contractions. Conditions are now suitable for determining the activity of the drug to be tested and standardized.

Assuming that ergot is the drug under consideration and the fluidextract the preparation requiring standardization, the operator further proceeds as follows:—

The alcohol from a convenient amount of fluidextract of ergot is evaporated by placing the latter in a capsule over a water bath, and the product is made up to its original volume with water. If a dose of this ergot preparation be now pipetted into the Ringer solution in which the uterus is suspended the following phenomena occur: The uterus, which was recording small rhythmic contractions on the drum of the kymograph, now forcibly contracts and records its contraction by a long sweeping curve. After the curve reaches its maximum and commences to decline, which may require from five to fifteen minutes, the medicated Ringer solution is quickly run off and replaced by fresh solution, previously adjusted to the proper temperature. The curve now quickly returns to normal and the uterus continues to record its small rhythmic contractions. Another dose may now be added, resulting in a similar contraction, which is recorded on the drum of the kymograph as before. By progressively increasing or decreasing the doses of a standard preparation, the operator is soon enabled to find the point where the dose given will produce almost a maximum tonus. It is now comparatively easy to determine the strength of the unknown solution by ascertaining the amount required to produce contractions of the same amplitude as those produced by the standard preparation.

DESCRIPTION OF CHARTS.—Chart No. 1 demonstrates, first, the normally acting uterus (*A* to *B*); second, the action when weighted down by shot (*B* to *C*), and, third, the action of ergot on the uterus when loaded and working against resistance (1, 2, and 3). This uterus is unusually active. As before stated, in selecting uteri for standardization work very active uteri are to be preferred, because they are able to carry the load, and will respond to stimuli sufficiently for standardization purposes.

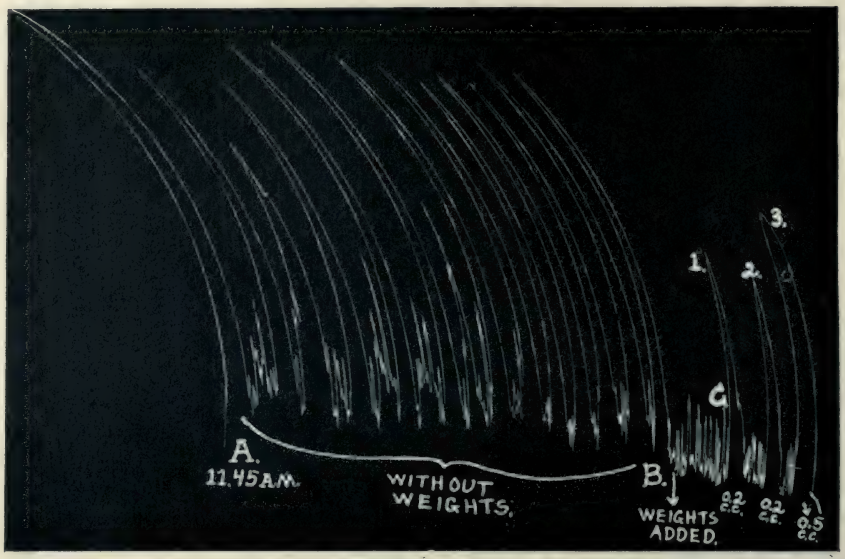


Chart No. 1.

Chart No. 2 shows, first, the normally acting uterus (*A* to *B*); second, the non-concordant results produced by repeated doses of the same amount of

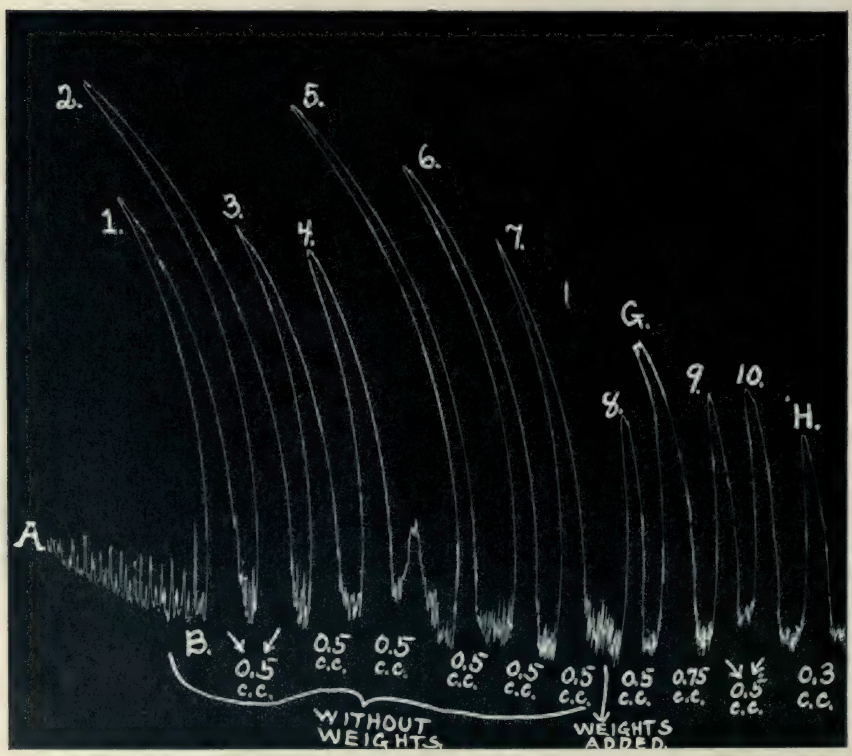


Chart No. 2.

fluidextract of ergot (1, 2, 3, 4, 5, 6, 7), and, third, concordant results obtained from doses given after the uterine contractions are controlled by weights (8, 9, 10). The curves *G* and *H* indicate the quantitative results obtained with a larger and a smaller dose.

Chart 3. This illustration is similar to Chart 2. *A* to *B* show normal contractions; 1, 2, 3, 4, 5, non-concordant results obtained without weights; 6, 7, 10, 11, 12, 13, concordant results obtained after weights were added. The curves 8 and 9 indicate contractions produced under the increased stimulation

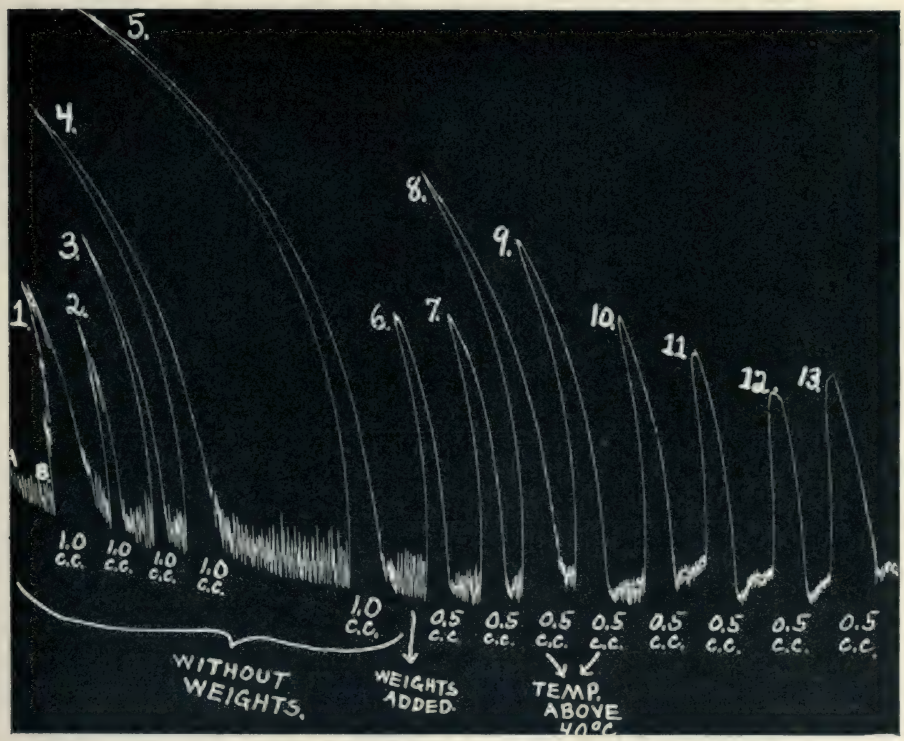


Chart No. 3.

due to rise in the temperature of the Ringer solution, and show the necessity of maintaining an even temperature during the experiment.

Chart 4. This chart clearly demonstrates the concordant results from repeating doses of equal amount. Figures 1, 2, and 11 indicate quantitative results obtained by varying the doses, and demonstrate the accuracy of this method of standardization.

During these experiments we were impressed by the differences in uteri as to power and muscular structure, and the mutual relation. Some specimens were greatly deficient in muscular substance and acted feebly. Other specimens showed greater muscular development and contracted strongly. Some of the specimens proved absolutely inert and would not respond at all.

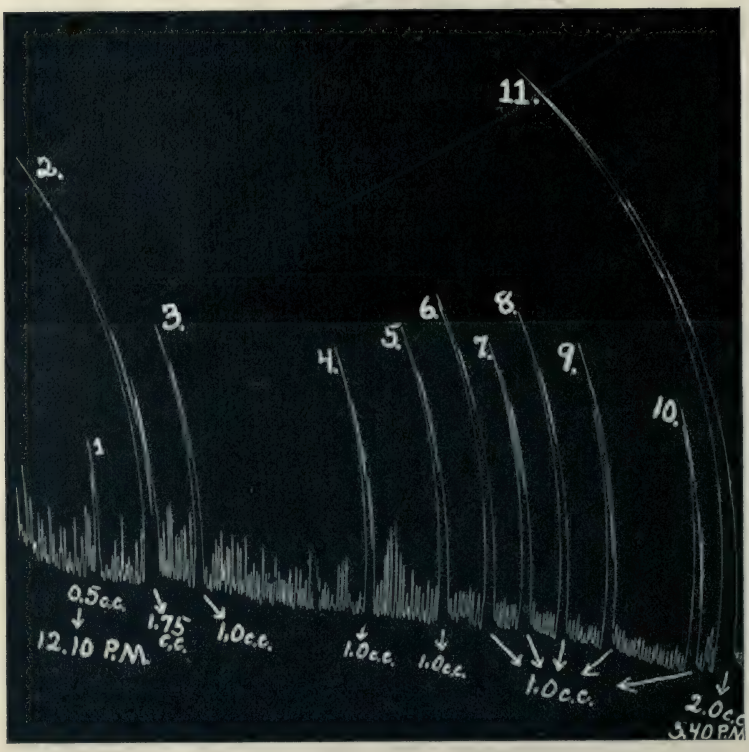
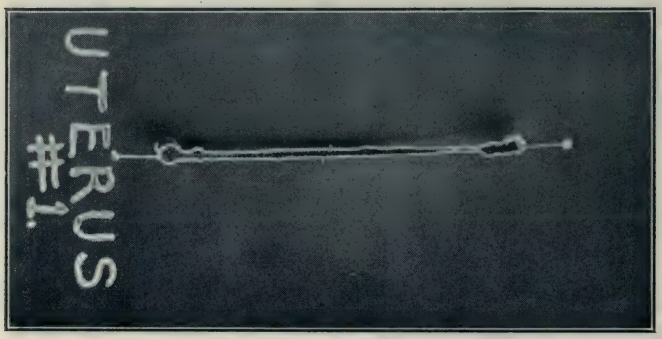


Chart No. 4.



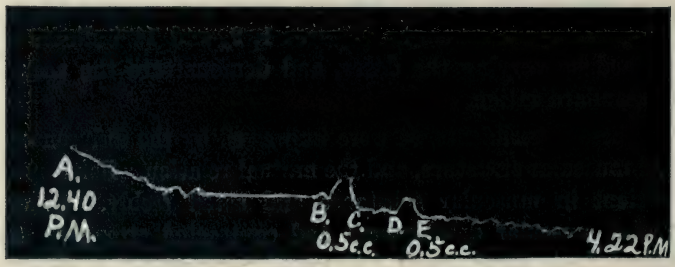
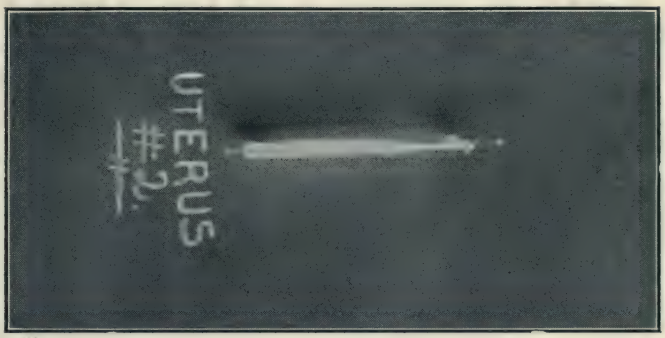


Chart No. 5, Uterus No. 1.

Chart 5 (Uterus No. 1) illustrates what occurs when an inert uterus is selected. *A* to *B* shows the condition of the uterus without ergot. *B* to *C* and *D* to *E* show slight curves after adding the ergot.



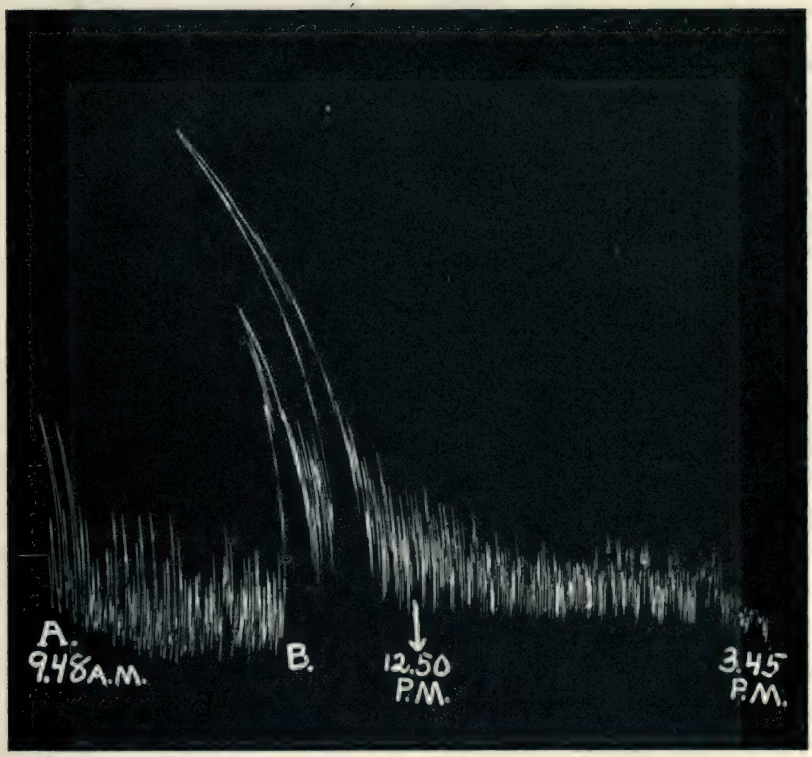


Chart No. 6.

Chart 6 (Uterus No. 2) shows a well-selected uterus acting under normal conditions, *i.e.*, without weights. At *B* ergot was added and the uterus immediately contracted. Instead of washing out the ergot in the usual manner, the uterus was allowed to continue under its influence. An increase in muscular tone was now noted, and the uterus went on with its automatic rhythmical peristalsis on a higher plane.

It will be noted in studying these charts as a whole that the guinea-pig's uterus appears to possess two kinds of motion, indicated by remitting curves and intermitting curves, respectively. The remitting curves appear to be constant, and not interrupted by the long, sweeping, intermittent curves upon which the former are superimposed. This is admirably illustrated

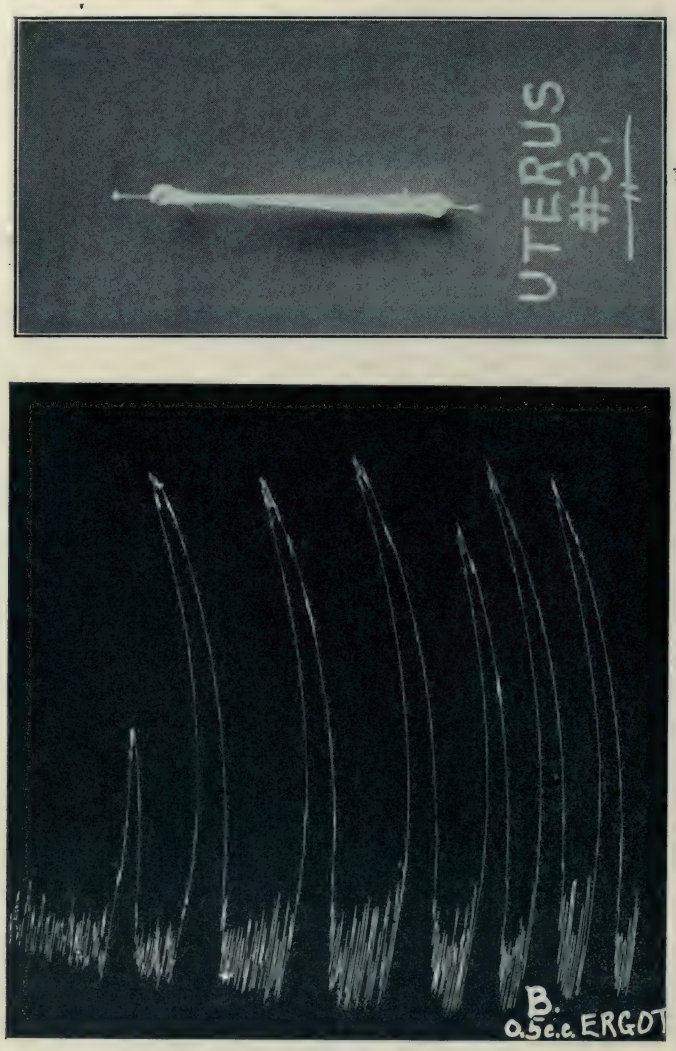


Chart No. 7.

by Chart 7 (Uterus No. 3). This uterus shows normal muscular contractions; also the short, remittent curves, and the long, intermittent curves, the latter occurring approximately once in every twenty or twenty-five minutes, and requiring about fifteen minutes to complete the contraction and relaxation. A dose of ergot was given at *B* without influencing the uterus; thus demonstrating that it had been undergoing complete normal contractions before the

ergot was added. A uterus of this character is of especial value for standardization work, as already stated.

Chart 8 also demonstrates the two motions of the uterus. It will be noted that the small rhythmic contractions are superimposed upon the curves produced by the tonic contractions. In order to show this point more clearly the drum was allowed to revolve at the rate of 1 revolution per hour, or ten times as fast as in all other tracings.

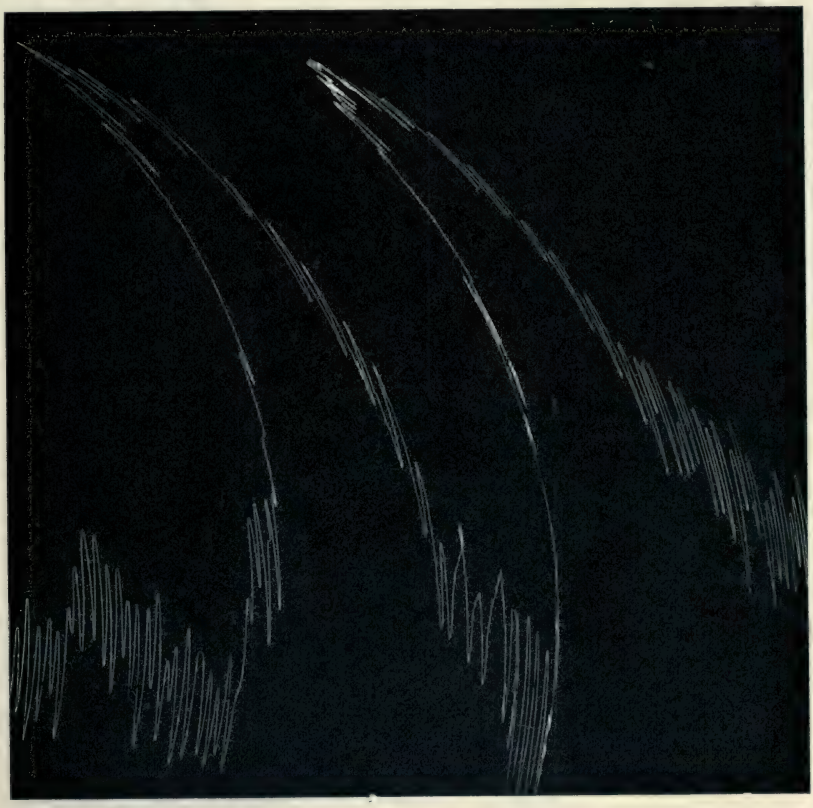
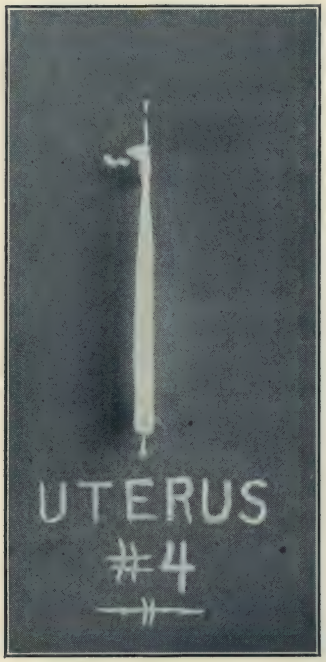


Chart No. 8.

Charts 2, 6, 7, 8, 9, 10, and 11 serve to illustrate the marked differences in the muscular character of the uteri of the guinea-pig, shown by exhibits of mounted uteri numbered 1, 2, 3, 4, 5, 6, 7, and 8, respectively, as well as by the curves recorded by these uteri on the revolving drum of the kymograph.

Exhibits illustrating differences in guinea-pig uteri:—

Uterus No. 1: See Chart 5.
Uterus No. 2: See Chart 6.
Uterus No. 3: See Chart 7.
Uterus No. 4: See Chart 9.
Uterus No. 5: See Chart 2 (*A* to *B*).
Uterus No. 6: See Chart 10.
Uterus No. 7: See Chart 11.
Uterus No. 8: See Chart 1?



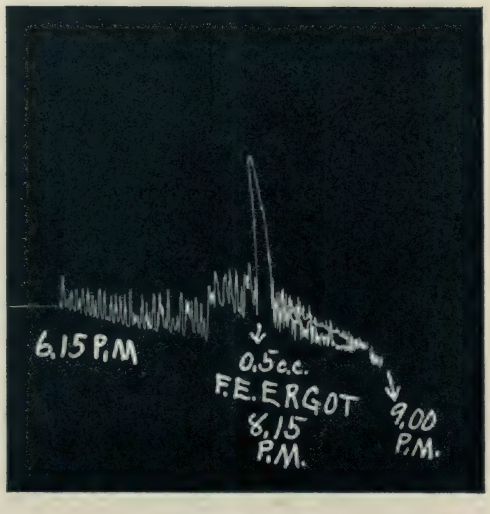
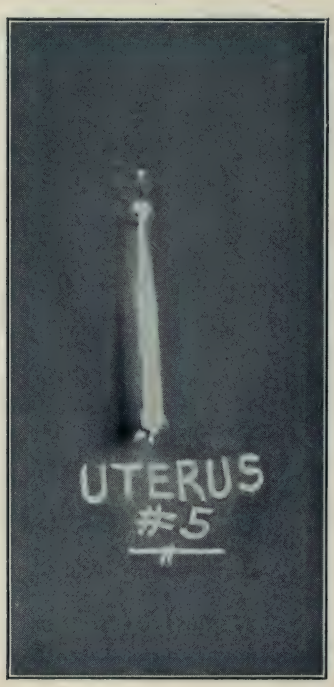
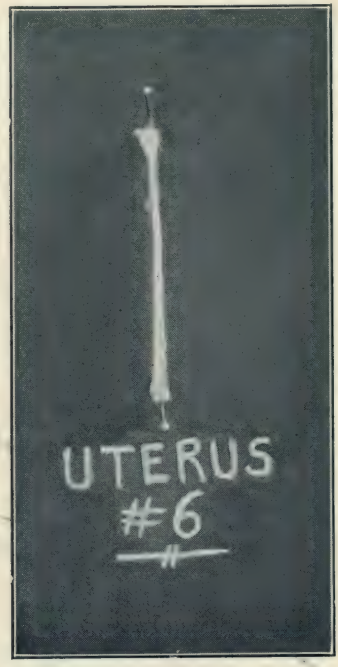


Chart No. 9.



This uterus (No. 5) was used in making tracing shown in Chart No. 2. The normal contractions of this uterus are shown from *A* to *B*.



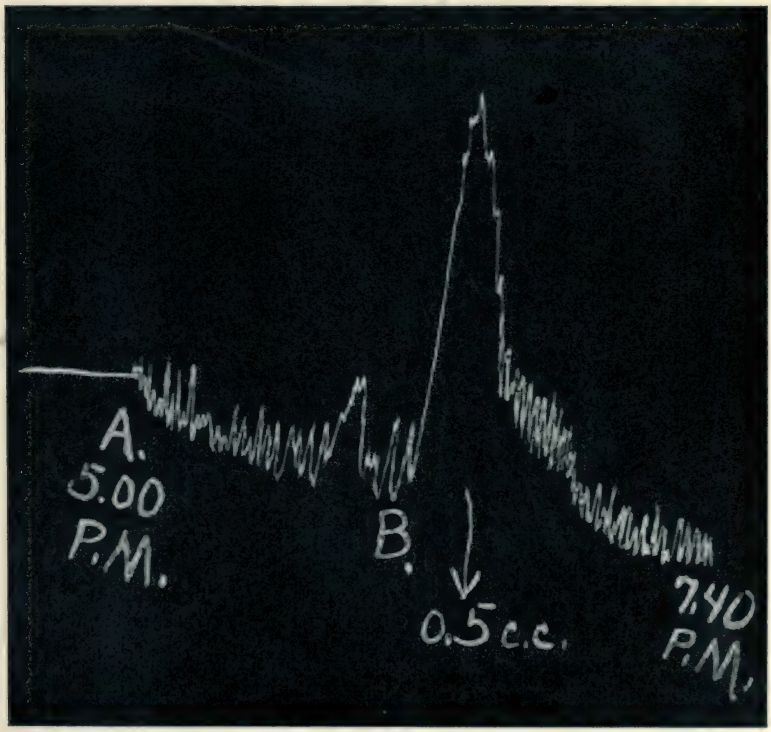
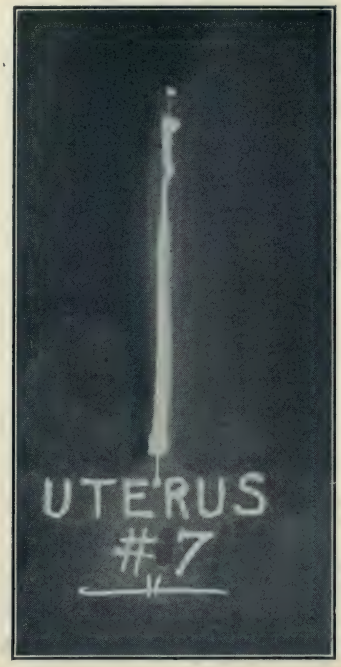


Chart No. 10.

These exhibits demonstrate the enormous variation in the normal uterine contractions and an equally enormous difference in susceptibility to the action of uterine stimulants. The differences between normal uterine movements and susceptibility to stimulation seem to be on parallel lines. How can these



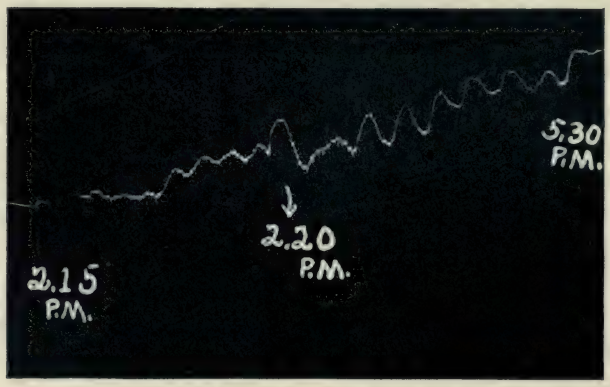


Chart No. 11.

phenomena be explained? Are they due to differences in the muscular structure of the uteri? Such differences seem to account in part for the phenomena, since inspection of the exhibits of uteri prepared and mounted for purposes of illustration show great differences in the amount of muscular tissue present. The "stringy" uteri were deficient in normal activity, as well as in activity in

response to stimuli. The thick, more muscular uteri were all active and sensitive.

To what extent do similar conditions exist in human uteri? In considering the action of non-standardized drugs we are always confronted with two uncertain factors, namely, differences in the susceptibility of patients and variation in the activity of drugs. By standardizing drugs we render them instruments of precision and eliminate one of these variable factors. Hence the importance of drug standardization.

THE TREATMENT OF THE PNEUMONIAS WITH MERCURY AND SULPHUR INTERNALLY.

By LOUIS KOLIPINSKI, M.D.,

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Pneumonias dominate the pathology of diseases of the lung. Individuals who in a lifetime have not been victims of these maladies are extremely prone to be seized upon in old age by a severe or fatal attack.

Immunity from a previous pneumonia is of short duration, and is no protection from a second or third infection, which, as in the case of erysipelas or articular rheumatism, is more prone to return to a former victim than to attack a new one. The great prevalence and heavy mortality of these diseases place them among the most important in medical practice, and their successful treatment becomes a subject of great significance.

The identification and early recognition of the pneumonias is a work both simple and sure, and where they are overlooked or miscalled the reason of error is often negligence of physical examination and want of analysis of subjective and objective symptoms. Pneumonias are often diagnosticated by the laity,—often by mothers in their children. The conscious adult subject feels himself suddenly stricken by a grave and serious malady.

The treatment of the pneumonias has varied with fashion and times from the heroic and tragic, through the meek and palliative, to the resigned and fatalistic. Thus, free and repeated bleeding, cupping and extensive fly blisters, with aconite, digitalis and veratrum viride, with mercury and tartar emetic, all have been in vogue in their day, to be followed later on with baths, wet packs, poultices, ice-packs, and cold winter air. Still later came the search for a serum or antitoxin. Finally, there prevails the use of opium for chest pains, sleeplessness, and cough, and of oxygen for dyspnea, with the knowledge that the disease is limited, and where nature cures, awaiting inactively the happy outcome.

Almost all of the treatments practised have been without clear or rational purpose, and, where markedly successful, have been equally efficient in other febrile diseases. Thus bleeding, aconite, veratrum viride, opium, and oxygen meet no clear or evident indication, but, on the contrary, are directly harmful; while quinine, digitalis, the cold-water bath and pack, and cold air are of equal or more value in other acute febrile diseases, and are doubtless more useful in supporting the patient than in arresting or destroying the disease.

To consider, then, a suitable treatment for these diseases it is necessary to describe briefly the morbid anatomy and histology of the organ affected and the symptoms resulting therefrom, since without these facts established and admitted it cannot be made plain what the purpose and the plan of treatment should be.

Pneumonias[1] are due to the irritant action of micro-organisms of different kinds upon the lung substance. They are generally inhaled, sometimes carried with the blood or lymph. *Lobular, catarrhal,* or *broncho- pneumonia* is usually a secondary or terminal lung inflammation, a bronchitis having introduced it. A specific germ is impossible, but the pneumococcus is often found. The affection is most common in infancy, childhood, and old age, and is the chief dangerous complication of measles and of whooping-cough. The lung is enlarged and collapses slowly. It crepitates on handling, but small nodules or indurations can be felt. Sunken, darker areas of atelectasis are visible. The unaffected parts may be emphysematous. The pleural surface over consolidations is often inflamed. The cut surface is smooth. The small bronchi are filled with mucopus. The peribronchial glands are enlarged. Splenization is the term given to this appearance. The air spaces are filled with leucocytes and epithelial cells, and a fluid, serous, or mucoid exudate. Leucocytes infiltrate the walls of the smallest bronchi, which are also occluded. The vesicular walls are likewise infiltrated.

Abundance of active bacteria, pyogenic and saprophytic, can carry this process to suppuration or even gangrene. A bronchopneumonia in which inflammatory infection ceases or is limited, however, rapidly undergoes resolution, and the products thereof are removed by expectoration and by absorption.

Lobar, croupous, fibrinous, or pleuro- pneumonia is a specific inflammation of the lung most often caused by the *Diplococcus pneumoniæ* of Fraenkel and Weichselbaum. Other pathogenic micro-organisms can cause a croupous lung inflammation. Infection seems usually to enter through the air-passages.

Lobar pneumonia is found at all ages and is the pneumonia of the prime of life. It is mildly contagious, and the immunity that the disease leaves behind is too short to deserve the term. The affection seizes upon one or more lobes of the lung, oftener on the right side, much less frequently on both, and runs a short, fixed course of inflammation which, in its changes as well as in the activity of its symptoms, must be counted by hours as in the case of a diphtheria, and not by days.

Laennec's description of the pathological changes of lobar pneumonia, based upon the gross appearance of consistency and color, comprise the three well-known stages of engorgement, red and gray hepatization of the lung.

In the engorged state the affected lung is bright red. Crepitation on pressure is less. The specific gravity is increased. On section, blood or serum exudes. The vesicular capillaries are dilated and winding. The epithelium of the vesicles is in part desquamating. Free red and white blood-cells abound. The interlobular connective tissue is hyperemic.

In red hepatization, solidification of the exuded serum has occurred. The inflamed lung is red-brown, does not diminish in size when removed, and does not crepitate. Its specific gravity is increased, and it quickly sinks in water.

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[1] Adami and Nicholls: Principles of Pathology, vol. ii. Coplin: Manual of Pathology, 5th ed. Strümpell: Lehrbuch der spez. Path. u. Therapie der inneren Krankheiten.

Its cut surface is granular, owing to section of minute fibrin coagula. From the bronchioles larger fibrin casts protrude. The lung tissue is friable. As Coplin says, there is nothing more characteristic than this last fact. With the microscope the blood-vessels are seen to be overfull. The air-vesicles contain the hardened exudate, holding within its meshes leucocytes, red blood-corpuscles, and epithelial cells. The epithelial cells are much less numerous than in bronchopneumonia.

The end stage of the acute inflammation is that of gray hepatization. The inflamed part is now softer and more elastic, but tears readily. The color has markedly changed, being now a grayish yellow. The cut surface is smooth and has become moister. The peribronchial glands and nodes are enlarged. With the microscope are observed degenerated leucocytes and epithelial cells. The fibrin is disappearing and an albuminous fluid remains. This stage is consequently that in which the emulsified or partly digested organic inflammatory structures can be expelled or absorbed.

With the pathological changes in the lung described as characteristic of catarrhal pneumonia, the *symptoms* by which the disease is recognized, and its different *terminations,* are as follows:—

The primary form is similar to a severe bronchitis, with a fever high or low, with or without an initial chill, pleuritic pain or soreness in the side. There is much coughing, with mucopurulent expectoration, not colored with blood. There is a unilateral area of lung crepitation at the base, with accompanying bronchitic râles; rarely the manifestations are on both sides. No bronchial breathing exists and percussion dullness is very slight.

The duration in favorable cases is several weeks, and recession of the fever is gradual. There is no specific micro-organism. The influenza bacillus is probably often active.

Similar, but diffused and much oftener bilateral, physical signs, and always with a preceding bronchitis, are found in secondary catarrhal pneumonia, prevalent during the existence of other diseases,—typhoid fever, influenza, whooping-cough, measles, chronic bronchitis, pulmonary consumption, and others.

The terminations of these pneumonias are variable. The course in some cases is short, in others long; many are fatal.

The symptoms of catarrhal pneumonia in the child are more marked and severe than in the adult. The general condition is grave. The patient is restless or somnolent. There is much fever and a rapid pulse, with a dry, shallow, painful cough, and scanty or no expectoration. The respiration is forced and very rapid, even to 60 or 90 in the minute. The evening temperature is high. The physical signs are: Subcrepitant râles, lessened percussion note, bronchial breathing, and bronchophony. The course is tedious and uncertain, and the disorder is often rapidly or slowly fatal. The vital symptom is dyspnea, with death from suffocation or asphyxia and acute heart dilatation.

Croupous pneumonia begins very suddenly, with a severe chill and a fever rising rapidly. A gradual beginning of the disease is much rarer. In many cases, simultaneously or within a day's time, a severe pleuritic stitch is felt.

Cough, inspiration, and speech are thereby suppressed. Accelerated breathing and dyspnea become increased more and more as solidification of the lung extends. The cough is short, shallow, and painful, and with much effort the characteristic glairy, tenacious, and bloody sputum appears. This sputum contains whole and dissolved red blood-cells, swollen and fatty leucocytes, alveolar epithelium, the *Diplococcus pneumoniæ* and other bacteria, all in threads of mucin. Rolled up, branch-like fibrin casts of the bronchioles are also found. In the end stage of the lung inflammation the viscidity of the sputum disappears; the latter is then mucopurulent.

Herpes of the lips and nose is often observed, usually in cases the course of which is favorable and tends toward recovery. From the high fever, painful cough, and rapid breathing, the patient sleeps but little, or else is much disturbed at night. Death or recovery with critical cessation of fever and subjective symptoms occurs within a week.

Physical examination reveals the affected side with shallow, the unaffected side with deeper, inspirations. The respirations in the adult are 30 to 60 in the minute. The accessory muscles of breathing are at work. The appearance of the face is either pale, congested, or cyanotic. The percussion note is a dull, tympanitic one—not flat as from effusion. In central pneumonia the note is unchanged. Auscultation elicits the crepitant râle (Laennec), bronchial breathing, and bronchophony. With softening and resolution of the solidified lung occurs the *crepitatio redux*. Leucocytosis in the blood is found in frank, active, and favorable cases. The finding of the pneumococcus therein indicates the case to be a grave one.

The chief danger to life in croupous pneumonia is extensive lung inflammation and the resulting diminished area of respiration. This danger is further augmented by all weak states of the heart, such as result from fatty degeneration of the heart muscle, from fibrosis, from the heart lesions of alcoholism, of asthma and of emphysema, and may be accompanied by the degenerative changes of age and arteriosclerosis. Collapse from heart weakness is a further danger. This collapse, as in typhoid fever, occurs with a rapidly sinking febrile temperature.

From these considerations of the form and nature of lung inflammations, the indications of *treatment* are plain, and are evidently different from those long and customarily followed. These indications are to absorb or remove the inflammatory exudate, to overcome the septic fever, and from the beginning of the treatment to consider how much additional labor the heart is able to perform. The liquefied exudate must be eliminated by coughing or by lymphatic absorption, and the septic fever by an appropriate systemic antiseptic. The heart must, if necessary, be aided with digitalis.

The class of remedies called stimulating expectorants, with one exception, possess no qualities adequate to fulfill the purpose contemplated, so that in treatment they fall into the place of feeble or fanciful adjuvants. Thus, senega, Tolu balsam, copaiba, the oil of turpentine, benzoin, the ammonium salts, and the alkaline iodides are all unequal to the task proposed.

Creosote is the exception referred to. Its praise by many practitioners for its favorable effects in these diseases is well deserved. It reduces high fever, strengthens the pulse by slowing it, and has a most pronounced power to stimulate the act of coughing. Creosote is useful in the pneumonias, but lacks the force or power to cut short or abort with certainty and uniformity the inflammation. While, therefore, a most useful agent, it is perhaps only one of second rank.

A number of years ago, the writer noted in several instances of broncho-pneumonia in infants, of tedious duration and with a stationary condition of catarrhal lung inflammation and solidification, with a feeble dry cough, a steady elevated fever, with much weakness and emaciation, without any favorable variation in the symptoms,—that when *mercury bichloride* and *precipitated sulphur* were given in small doses at two-hour intervals by day and three-hour intervals at night, at the end of the second or third day of this treatment the fever disappeared with a rapid but not critical decline, easy sleep returned at night, and the short, shallow cough became paroxysmal, deep, and moist. The cases first treated in this manner recovered quickly and permanently.

Further use of the mercury-sulphur treatment showed it to be as applicable to croupous as it is to catarrhal pneumonia, and at all ages of life. Apparently its action is to cut short the lung infection in a very short period of time. The patient is observed to respond to the remedy by a speedy decline and cessation of the fever and by a deep and violent cough, with the bringing up of an abundant mucopurulent sputum. In croupous pneumonia, the rusty appearance of the sputum is not very pronounced under this measure, and the expectoration is much less tenacious and gluey on the following day.

The treatment should be steadily pursued for several days. This affords ample time to determine if the patient has reacted favorably and the remedy has accomplished its work. The diagnosis having been correctly made, the state of the heart muscle and valves determined, complications detected if present, and pulmonary tuberculosis, meningitis, purulent pleurisy, and pericarditis excluded, the patient is given *milk* and a *liquid diet* only.

The mercury-sulphur combination is given regularly at two- or three- hour intervals for two or three days. If, when the thirty-second dose is reached, catharsis has not been produced, ½ ounce (15 c.c.) of *castor oil* is given to empty the intestinal tract. Should free purgation and colicky pains result from the mercury and sulphur, the castor oil is equally useful to abate this discomfort.

After the temperature in the evening is normal and recovery begins, the mercury-sulphur mixture is continued for several days longer at four- to six-hour intervals. Should no change in the symptoms and fever appear at the end of the third or fourth day, the treatment has failed, and the cause of this will be found in a complication not previously detected or even in an error in the original diagnosis.

The pneumonias should never be treated without topical applications of *heat* or *cold* to the posterior and lateral parts of the thorax. The reasons for this are important. The majority of pneumonias are preceded or accompanied

by pleurisy. The chest pain of pleurisy is severe and highly repressive to free inspiration and to coughing. The breathing is thereby made shallow and rapid, the cough impeded,—two states tending to lung congestion and consolidation. The pleuritic pain prevents the patient from lying at ease, and prevents sleep. It is of very limited duration,—a day or so,—and is removed efficiently and safely with *flaxseed-meal poultices* in young children and with *hot-water bags* in older subjects. *Ice-bags* are also efficacious for this purpose. External heat is perhaps the better method, as it is more grateful to the sick. The effects are speedily apparent, particularly in infants,—slower and deeper breathing, freer cough, and quiet sleep.

Acute insomnia is present in most cases. When produced by high fever, chest pain, cough, headache, or feeling of general discomfort it should remain untreated. The elimination of fever is its cure. The sleeplessness is, furthermore, of less moment in this treatment, as sulphur in the small and frequent doses used acts as a gentle hypnotic in the absence of pain. When the insomnia is an early feature of alcoholic mania or delirium tremens, the remedies are digitalis and hyoscine hydrobromide.

Cough is an essential feature of every case of pneumonia that is not a hopeless one. The pneumonic with a cough, however frequent and prolonged it may be, will recover. The pneumonic without cough or with a single, dry, shallow, expulsive effort is in a grave or critical state. Hence any narcotic or sedative drug which produces shallow, rapid breathing and suppresses or represses the cough is harmful and dangerous. The complaints of suffering arising from a severe cough are much more reassuring to the practitioner as regards recovery than the quietude of stupor and cyanosis.

The functional power of the heart must be determined early in the treatment. This is not necessary in children unless a congenital heart defect or a rheumatic endocarditis is found. Where the cardiac contractions are strong, regular, and normal for the degree of fever present, where the valvular mechanisms act harmoniously, no medication is needed. But where valve defects are present, the heart dilated; where the contractions are weak and rapid, irregular or intermittent, *digitalis* in one daily dose may properly be administered from the beginning. The digitalis effect upon the heart, when once established, must be kept up until the patient is fully recovered and convalescence at an end.

The practice mentioned in textbooks on treatment, of aiding the heart action after it has become inefficient, is both theoretically and practically incorrect. A weakened heart may be restored to adequate force and power by the skillful use of the remedy, but the accompanying dangers,—acute dilatation or embolism,—are so great that the result is less certain than when aid and reinforcement are brought up in advance of the time of need.

The formula of the mercury and sulphur combination used is as follows:—

℞ Hydrargyri chloridi corrosivi ..... gr. ss (0.03 Gm.).
Sulphuris præcipitati ..... ʒij (8 Gm.).
Aquæ destillatæ bullientis ..... fʒiv (120 Gm.).
M. Sig.: Shake and give quickly in the dose of 1 teapsoonful every two or three hours.

The prescription at first sight seems incongruous and incompatible. Even its administration may appear crude and imperfect. The chemical, pharmaceutical, and medicinal properties, however, are positive and correct.

When it is attempted to suspend precipitated sulphur in water, this is found to be almost impossible. The sulphur remains floating upon the surface for many days. Upon prolonged trituration with water in a mortar, a somewhat better suspension on agitation results. It is only when the sulphur is triturated or agitated with very small quantities of boiling water that it becomes homogeneously diffusible on shaking, though on standing it sinks mostly to the bottom. Thus made up it can be dispensed for practical purposes.

The sulphur mixture is neutral to litmus. When the sublimate is added to it, litmus shows a feeble acidity. The sublimate undergoes slow decomposition. Although when the remedy is freshly prepared the mercury salt is ingested as bichloride, which can be readily detected in solution with the ordinary tests for mercuric salts, at the end of a week the liquid shows no mercury in solution. Two grains of sodium chloride preserve the bichloride a much longer time.

This combination has further medicinal peculiarities of its own. Given continuously day and night in the treatment until the desired effect is attained, it does not produce mercurial poisoning, stomatitis, enteritis, or nephritis; for when the gastrointestinal tract has been saturated with it, so to speak, the laxative action of the sulphur begins.

Furthermore sulphur, like potassium iodide, is a reliable chemical antidote in mercurial as well as in lead poisoning.

The possibility of giving the bichloride of mercury in very frequent doses with safety to the human economy with this admixture of sulphur renders the treatment of the pneumonias by this method prompt and efficient, for the germicidal power of corrosive sublimate operates through the blood, without harm to the patient, against the various pathogenic micro-organisms responsible for these inflammations. With germ destruction come cessation of inflammatory exudation; liquefaction, absorption, or expectoration; rapid cessation of fever, and restoration of the respiratory and vascular correlation peculiar to the normal state.

RECENT IMPROVEMENTS IN THE QUININE TREATMENT OF LOBAR AND LOBULAR PNEUMONIA:

The Auxiliary Use of Cocaine, Posterior-Pituitary Extract, and Bacterial Products.

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THAT acute pneumonia, and especially acute lobar pneumonia, has for many years occupied first place in the dangerous infections of the temperate zone is so well known that it has become unnecessary to cite statistics. Twenty-five or thirty years ago the mortality of acute lobar pneumonia was usually stated to be about 25 per cent. under all circumstances, and the tendency of systematic writers was to teach that treatment, apart from good nursing and the meeting of certain symptomatic indications, exerted but little influence. On the other hand, many medical men not occupying official positions, and especially those who practised in country districts, expressed great faith in the influence of certain special methods of treatment, and looked on a mortality of over 10 per cent. as excessive.

Recent mortality statistics as collated by G. A. Gibson[1] are, however, even more unfavorable than those given by teachers and writers of a generation ago. Gibson's figures are taken from the mortality returns of Great Britain, and from the papers of Wells, Musser and Norris, Beddard, Rychner, and other American, British, and Continental writers, and from many of the leading hospitals of the world. The death-rate over a period of forty years, as given by the various sources and authorities cited, ranges between 20 and 22 per cent., but, if the last decade alone be taken, it is between 30 and 40 per cent. Thus in the Massachusetts General Hospital, according to Wells, it was 18 per cent. in 1822 and 30 per cent. in 1903. In the Boston City Hospital it was 21 per cent. in 1865 and 39 per cent. in 1903; in the Cincinnati Hospital, 31 per cent. in 1866 and 43 per cent. in 1903; in the Wiener allgemeines Krankenhaus, 18 per cent. in 1840 and 27 per cent. in 1899; in the Glasgow Royal Infirmary, 16 per cent. in 1831 and 30 per cent. in 1900. From his own wards Gibson reported a mortality, during the last ten years, of 31.9 per cent.

The classes of cases treated in different hospitals differ so much, and age, sex, race, social status, and personal habits of the patient count for so much, that comparison between various series of statistics would teach but little.

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1 Gibson, G. A.: "Acute Pneumonia, its Prognosis and Treatment," Glasgow Med. Jour., May, 1911.

Moreover, it is well known not only that there are seasonal variations, but also that in certain years the attacks are much more severe and the fatalities correspondingly greater than in other years. Still, the fact is evident that all over the world the percentage mortality of pneumonia is increasing, and reference to any volume of vital statistics will show likewise that the number of cases reported is steadily rising. Improved diagnosis may account for this last, in part; but it would tend to lower, rather than to increase, the reported mortality percentage.

From the experience of any one observer, sweeping conclusions cannot be drawn. Nevertheless, it is worth while to continue to direct professional attention to the comparatively favorable result (that is, a much reduced mortality, ranging from 9 to 20 per cent.)[2] that attends a special method of treatment systematically carried out during the last decade at two hospitals[3] receiving quite different classes of patients, as well as in private and consultation practice; that is, carried out not only during the time of greatest general increase in mortality, but also under a great variety of conditions as regards persons, environments, seasons, years, and other factors.

The underlying principle of this method of treatment is not new; and while its systematization, which has been gradually worked out since 1904, in my hospital services, partly at Jefferson Hospital and partly at the Philadelphia General Hospital, contains some original features, the object of this paper is not to claim priority, but to try to gain a wider use for certain life-saving measures.

During the last few years the roof wards at Jefferson and the galleries at Blockley have offered improved facilities for obtaining that constant supply of fresh air which is an integral part of the method, and the more favorable showing for this period may be attributed in part to that factor. The attempt was always made, however, to secure ample ventilation of the wards or special rooms in which the pneumonia patients were placed, so that the difference, after all, is not the great disparity between air and no air, but that moderate but still important difference between well-aired rooms and the open air. There is a difference also between a roof constantly covered with an awning and one open for the most part to the sky. The "blue sky" method is by far the best; it is preferable to let down the awnings only under stress of stormy weather.

The bed-clothing should be ample, and, if needed, heating-pans, etc., be employed. Distinction must also be made between catarrhal and croupous pneumonia in this respect: that whereas in lobar pneumonia, as a rule, the body should be kept warm and the air entering the lungs should be cold, in bronchopneumonia it is often desirable to have the air *warmed* as well, even up to 80° F. with children, the aged, and the feeble especially. Also in some cases of lobar

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2 Solis-Cohen, S.: Trans. Assn. Am. Phys., 1911, xxvi, 169; Am. Jour. Med. Sc., January, 1912, N. S., cxliii, 40; Internat. Med. Clinics, Series 22, iii, 56.

3 At the Philadelphia General Hospital any mortality under 50 per cent. is quite favorable, owing to the large number of alcoholics and neglected cases, etc., there received. Also its records are imperfect for many reasons.

pneumonia (in aged patients, or in alcoholic subjects especially) the air that is breathed must not be too cold. This is a matter for careful judgment in each case.

Apart from fresh air, dependence has been placed on the following measures:

First, the *effective* use of *massive* doses of quinine. The most potent preparation, namely the very soluble double hydrochloride of quinine and urea, has been chosen, and one of the most active methods of administration, namely, intramuscular injection of a 50 per cent. solution, is employed.

Second, the hypodermic injection of cocaine hydrochloride solution or of an extract of the posterior lobe of the pituitary body[4] for the maintenance of blood-pressure.

Third, in cases of prolonged fever, delayed resolution, or tardy convalescence, the injection of bacterins (pneumococcus or "mixed" vaccines, personal or stock) has been resorted to, in an endeavor to expedite recovery, and apparently with good result. Further experience with this is needed before positive general statements can be made. But in special instances the good influence has been striking.

The details of the treatment may thus be summarized:—

On admission, so soon as the diagnosis is verified, the patient, if a fairly strong adult, receives under proper precautions[5] an intramuscular injection of from 1 Gm. (15 grains) to 1.6 Gm. (25 grains) of the quinine and urea salt in 50 per cent. solution in hot sterile water. Children, the aged, and the feeble receive smaller doses. The injection is repeated, but rarely with a greater dose than 1 Gm. (15 grains), every third hour until the temperature falls, and remains, below 102.2° F. One-half grain (0.03 Gm.) of cocaine hydrochloride or of caffeine (sodiosalicylate) or 1 c.c. of pituitary liquid (representing 0.2 Gm. of fresh posterior lobe) or 1 c.c. of a 1:1000 solution of the posterior pituitary principle is injected hypodermically at the same time with the first dose of quinine, and repeated, likewise, every third hour, until the curve representing systolic blood-pressure in millimeters of mercury (taken in the arm), rises and *remains above* the curve representing pulse frequency in beats per minute.

This latter practice is founded on the observation of G. A. Gibson, of Edinburgh, concerning the prognostic significance of the relation between pulse frequency and blood-pressure, thus charted. I have proposed to call this relation the Gibson pulse-pressure ratio, and trust that the suggestion will be adopted, as a worthy means of perpetuating the memory of that great clinician, whose recent demise is so marked a loss to medicine.

The injections of quinine are governed in part by the temperature and in part by the general symptoms. The injections of cocaine, caffeine, or pituitary

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[4] More recently I have been using a preparation termed "hypophysin"—a 1:1000 solution of the active principle of this structure. It seems to be even more potent than the extract.

[5] The skin is to be painted with tincture of iodine; the injection made deeply; the syringe emptied, so that there will be no dripping over the skin on withdrawal of the needle, and the point of puncture sealed with collodion or iodoform-collodion.

preparation are governed chiefly by the pulse-pressure ratio, but also by the general character of the pulse and of the cardiac action, the renal activity, and the general symptoms. Sometimes these agents are alternated; sometimes camphor (2 to 10 grains in sterilized olive oil) is used as an adjuvant or temporary succedaneum. I have also used epinephrin, atropine, strychnine, and even digitalis preparations and principles on occasion. But the routine is usually cocaine and the pituitary preparation.

Creosote carbonate is sometimes administered by mouth during or after the course of quinine, if called for by special symptoms; less frequently (in cases in which extremely viscid sputum is expectorated with difficulty) ammonium salts (usually bromide, acetate, or carbonate) or terebinthinates are given, or inhalations of appropriate vapors instituted. In other words, special symptoms are relieved when necessary. But this is not an invariable part of the routine.

No invariable maximum limit has been fixed to the number of the injections of quinine, of cocaine or of pituitary liquid, but it has not been considered wise to continue the three-hourly injections beyond the first twenty-four hours, and in but few cases has it been necessary to continue them so long as this. In those cases in which the desired effect, as indicated by temperature or by the Gibson blood-pressure pulse rate relation, has not been reached within the first

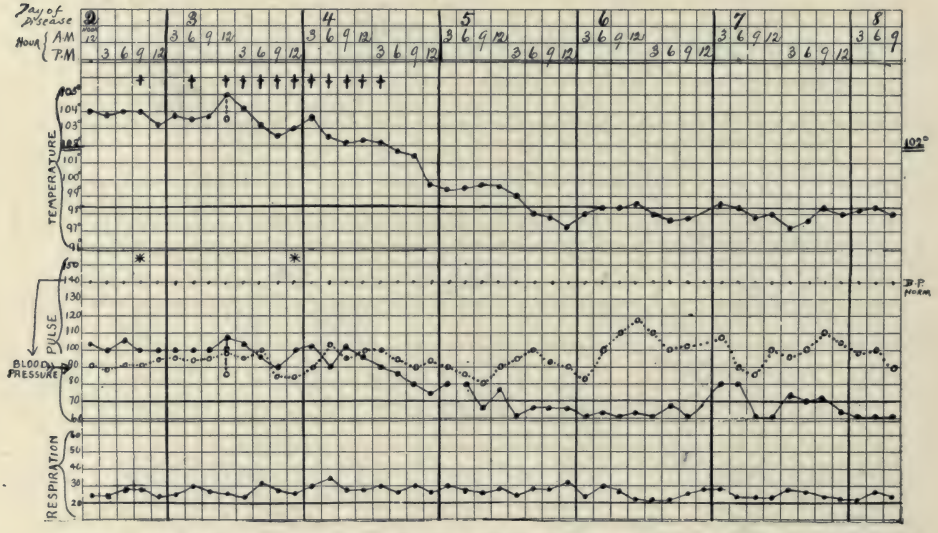

CHART 1.—Lobar pneumonia. Severe. Patient, man, laborer, aged 50. Admitted second day. Deep lesion, middle right lung. Quinine and urea salt 12 Gm. (180 grains) in forty-two hours. Cocaine salt, 2 injections 0.03 Gm. (½ grain) each. Defervescence by lysis, complete fifth day. Sputum, rich culture pneumococci. Relatively low leucocyte count (14,000) increased following quinine injections (20,000). Polymorphonuclear percentage increased from 75 to 80. Resolution began eighth day; complete fourteenth day. Each plus sign (+) indicates an injection of quinine and urea hydrochloride 1.0 Gm. Each star (*) indicates an injection of cocaine 0.03 Gm. The vertical chain of dashes and circles indicates sponge and result. The line composed of dots and circles indicates systolic blood-pressure in millimeters Hg.

twenty-four hours, the interval between the injections has been increased to six hours. When the effect is gained, the repetition of the doses depends on the maintenance of it.

In general, the effort is made to give as much quinine as is necessary and can safely be borne within the first forty-eight hours, and as little cocaine or pituitary or camphor, etc., throughout the treatment, as is necessary to maintain the systolic blood-pressure curve at a safe distance above the pulse-rate curve. Proper attention is given to the excretions and to the quality as well as quantity of the urine. Saline infusion, alkaline-saline beverages to the point of keeping the urine alkaline, external applications of heat by flaxseed poultice, electric heating pad, or cotton or lamb's wool jacket, and in rare instances oxygen inhalation are among the auxiliary methods employed routinely or in selected cases. But it is unnecessary to dilate on these, or on the details of diet and nursing, which are to be taken for granted.

The title of this communication is "Recent Improvements in the Quinine Treatment of Lobar and Lobular Pneumonia." To these alone is special attention called. Other matters are incidental and explanatory. The improvements to which reference is made are the use, in an almost routine way, of cocaine and pituitary liquid, and the addition of the pneumobacterin injections after the

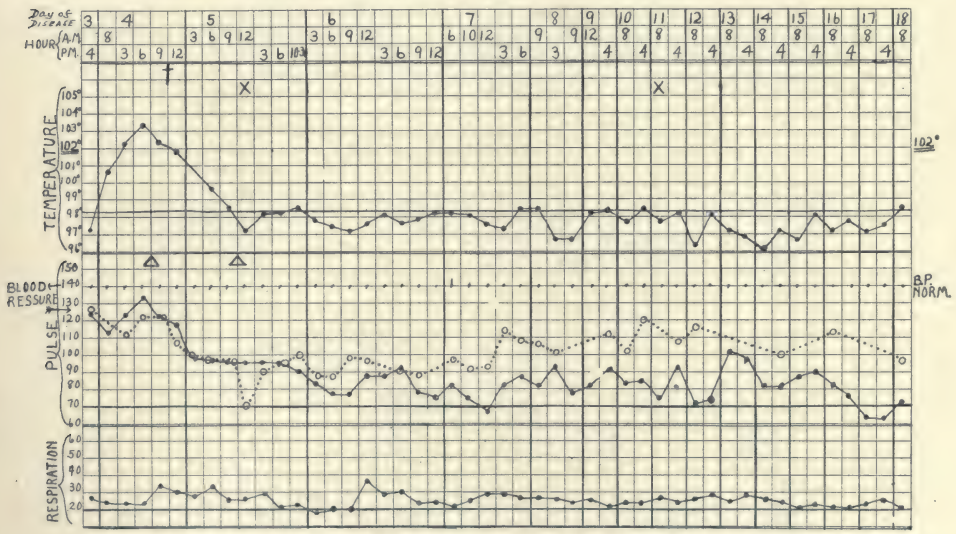

CHART 2.—Lobar pneumonia. Average severity. Patient, man, drug-clerk, aged 38. Admitted third day. Extensive consolidation, left base. Associated pleurisy. No effusion. Early defervescence, with delayed resolution. One injection quinine and urea salt. Two injections pituitary extract. Two injections pneumococcic bacteria. Leucocyte count 22,000; polymorphonuclear 70 per cent. Increased following first bacterin injection to 34,000; polymorphonuclear 80 per cent. Resolution began two days after second bacterin injection, eleventh day of disease. Complete twenty-second day. Each plus sign (+) indicates an injection of quinine and urea hydrochloride 1.2 Gm. Each × indicates an injection of pneumococcus bacterin. Each triangle (△) indicates the use of pituitary (posterior lobe) extract. The line composed of dots and circles indicates systolic blood-pressure in millimeters Hg.

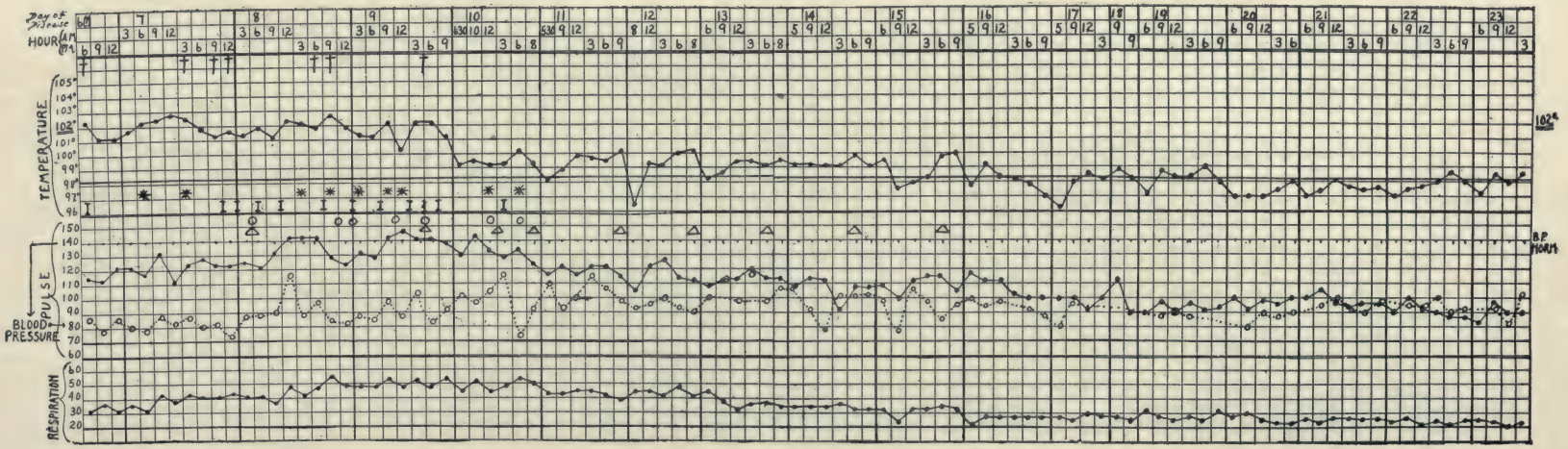

CHART 3.—Double lobar pneumonia. Severe. Extensive consolidation both bases. Patient, man, peddler, aged 36. Admitted almost moribund, sixth (?) day. Seven injections quinine and urea salt. Eleven injections camphorated oil. Nine injections pituitary extract. Nine injections cocaine salt. Seven injections strychnine salt. Defervescence completed on nineteenth day. Resolution began seventeenth day; completed twenty-seventh day. Each plus sign (+) indicates an injection of quinine and urea hydrochloride 1.2 Gm. Each star (*) indicates an injection of cocaine 0.03 Gm. Each double dagger (‡) indicates the use of 30 minims camphorated oil. Each circle indicates the use of 0.002 Gm. strychnine sulphate. Each triangle (△) indicates the use of pituitary extract (1 c.c.=0.2 Gm. posterior lobe). The line composed of circles and dots indicates systolic blood-pressure in millimeters Hg.

most acute symptoms have been controlled. I have elsewhere discussed the philosophy of the treatment, and may here be brief.

The change in the character of the defervescence from crisis to lysis, as exemplified by many charts which I have published and by those accompanying this article, together with the great symptomatic relief afforded by the quinine in the presence of an unchanged evolution of the pathologic process in the lungs, justifies the belief that the effect of the drug is antitoxic; and this conclusion is further strengthened by the entire absence of cinchonism, notwithstanding the enormous quantity of quinine administered and absorbed. I have asked experimenters to test this; but they have not done so. I can speak only from careful clinical observation. There appears to be a mutual neutralization of quinine and pneumonia poisons. This in a measure tends to prevent cardiovascular (or sympathetic) paralysis, which is the most dangerous element of the morbid process. In cases seen early a very few injections suffice, in some cases only one. In cases seen on the third day, or later, more active treatment is needed; and, moreover, aid is needed to support cardiovascular (sympathetic) tone. This assistance is furnished by cocaine, by pituitary, by epinephrin, and in less degree by camphor, by atropine, by strychnine, and even, when the quinine is used, by digitalis.

This last is a point to which I shall refer at length in a later paper. At present I shall content myself with the remark that the phenomenon seems to bear out the view that digitalis principles, like quinine, are chemically neutralized by the pneumonia poison; thus explaining the value attributed by certain observers to enormous doses of this drug in acute lobar pneumonia, and the common experience of its uselessness in ordinary dosage.

I have not used strophanthin, but, from my recent experience with the latter in cases of auricular fibrillation, I should be inclined to give it a trial when the routine method fails—provided, however, that other symptoms do not contraindicate vagus stimulation.

As a rule, however, the systematic use of cocaine or pituitary liquid, or both in alternation, renders it unnecessary to resort to other methods for this particular purpose; the chances being that in cases which fail to respond to these agents the severity of the intoxication or the extent of the morbid anatomical changes in the lungs is too great to be overcome.[6] This may depend on the extreme virulence of the particular strain of pneumococcus or other microbe by which the infection is excited; on the association of several forms of microbes; or on a deficiency of resistance or recuperative power on the part of the patient, whether in the tissues, the blood-serum, or the body-juices.

If we knew definitely the nature of this deficiency in a given case, we might be able to compensate for it by the use of an appropriate serum, containing complement or immunizing bodies, or phagocytic enzymes, or whatever it might be that was lacking; but we have not yet arrived at that point of knowledge or the required degree of resourcefulness. Some of the serums that have been

[6] This is illustrated by chart published in International Medical Clinics, vol. iii, Series 22, p. 63.

proposed might be useful. I cannot say, as I have had no experience in that direction. I have tried, however, to stimulate the powers of defense and restoration by the use of appropriate bacterial preparations and products. I can say positively that I have seen no harm from these. I believe that I have observed distinct and even amazing benefit; but I want to reserve the full discussion of this phase of the subject until I have completed some studies that are still under way. I prefer to use the bacterins after, rather than before, the fifth day; but cannot be dogmatic on this or any other feature of their use.

Concerning the great superiority of treatment by quinine and pressure-raising medicaments over all other routine or expectant methods yet proposed, I have not the slightest doubt. It has in my own hands cut the mortality of the severest cases in half. But this is not its only merit. The comfort, especially the relative ease of respiration of the patients, even of those who do not recover, is wonderful to see. The entire clinical picture is changed.

From charts alone, of course, this is scarcely evident. Little information can be drawn from these as to those signs and symptoms—the physiognomy, color, attitude, mental condition, and general appearance of the patient; the character and progress of the physical signs; the character and frequency of the cough; the character of sputum; the characteristics of the respiration and cardiac action other than frequency, etc.—on which the experienced physician bases his estimate of the gravity or progress of an individual case. The critic will have to accept the judgment of the observer that the conditions were such as to excite apprehension as to ultimate result, and that the medicaments were administered only when the state of the individual patient at the special time seemed to call for active therapeutic intervention. Necessarily but few charts can be reproduced for publication; but it may readily be seen that in some of the cases very few injections were given, and in some very many.

One point, however, to which especial attention may be directed, and which the charts all exhibit very well, is the effect on the blood-pressure, and even more than this the effect on the Gibson pulse-pressure ratio, of the cocaine or caffeine, and of the pituitary preparation. It is most marked in the case of the latter agent. In private practice the latter is ordinarily to be preferred. In hospitals mistaken ideas of economy sometimes lead trustees of institutions otherwise liberally managed to restrict the provision of expensive drugs (although they provide costly surgical appliances and surgical dressings without stint). This may prevent its use as freely as seems to be desirable.

Until recently I had reserved the treatment for cases in which active intervention was needed, permitting other patients to recover without it. And my statistics are based, therefore, on cases of at least moderate severity, and from those to the worst possible types. I now give the initial dose of quinine to every patient. In consequence, we have seen the mild cases become so much milder that they give no anxiety whatever, and require little further treatment beyond good nursing.

When bacterial therapy and serum therapy are sufficiently developed to be applied with precision in supplement to quinine, I confidently expect the mortality of pneumonia to become so small under the combined method that I

hesitate to suggest a probable figure, lest I be deemed extravagant in my optimism.

In conclusion, a word as to the duration of treatment and the number of injections. The quinine injections are rarely continued beyond seventy-two hours, and the number of injections in this period (each, in most instances, containing 1 Gm.) ranges from 1 to 15. In one exceptional case of double lobar pneumonia, 22 injections were given, with good result. The number of cocaine or pituitary injections throughout the course of treatment ranges from 1 to 20. In an ordinary case—if there be such a thing—the number of quinine injections will be about 5 or 6, and the number of cocaine and pituitary injections 3 or 4 each. But in this, as in all other features of the treatment, there must be individualization. The routine is a guide, not a fetich. And the dose of any and every agent is that which I have elsewhere laid down as a general principle—*enough* (to produce the effect desired) *and no more.*

DISCUSSION OF PAPERS BY DRS. KOLIPINSKI AND SOLIS-COHEN.

Dr. Riley said that he had had no personal experience with the treatment suggested by Dr. Kolipinski, but that upon general grounds he questioned whether it would not prove dangerous in the case of old people, and particularly in those suffering with renal disease. The use of bichloride of mercury in the presence of deranged kidneys was a questionable therapeutic procedure, and it was well known that weakness of these organs was a common concomitant of pneumonia. So far as was known, the method had only been employed to a limited extent, and he believed that further investigation would be necessary before arriving at a conclusion as to its value. He agreed with Dr. Solis-Cohen that while pneumonia was a common cause of death, in most cases coming to autopsy lesions indicative of the disease were found, whether the individual had died primarily of pneumonia or not. Hence statistics were not as reliable as might be desired. The figures given strongly indicated that the prevalence and mortality of pneumonia had increased during recent years; but it was well known that the disease was more prevalent in some years and periods than in others, and, on the whole, he was inclined to doubt whether there had been any notable increase in the number of cases. As to the treatment, quinine had been found a dangerous drug for hypodermic use. It had given rise to tetanus in a considerable number of cases. This was observed particularly in the Indian Army Service. There, the injections were given most carefully under antiseptic precautions by skilled men, and yet after seventy-two hours or more tetanus was noted in not a few instances. In explanation it had been suggested that the tetanus spores, otherwise innocuous, existant in the patient, particularly in the intestines, were aroused to activity by the injection and, entering the blood, gave rise to the symptoms of the disease. In any case, the procedure had been found to be attended with danger, and it was well to bear this in mind in deciding upon the injection treatment. Every physician had his own treatment for pneumonia. He deprecated the let-alone treatment so long in vogue. Under it there had been no real progress in mastering the disease. Several years ago he had reported a number of cases in which a mortality of less than 8 per cent. had been obtained by the use of large doses of digitalis. At first he had been skeptical, but the results had been good, and now he was as enthusiastic over the method as Dr. Solis-Cohen was over his. Of late he had employed acetylsalicylic acid in combination with the digitalis. The treatment was particularly useful in the case of old people and when the kidneys were deranged. He had noted but little salicylism.

Dr. Oliver T. Osborne, New Haven, said that while it was undoubtedly true that in many cases death had been ascribed to pneumonia when it was really due primarily

to other causes, there could be no doubt as to the great prevalence and high mortality of the disease. Dr. Solis-Cohen had obtained most excellent results from the fresh-air treatment of pneumonia as well as from the medicinal treatment, and it was difficult to say how far each of these agencies acted in the production of the good results. They had been so favorable, however, that he was inclined to give much credit to both. He himself did not know the best treatment for pneumonia, *i.e.*, the best treatment for all cases. In his opinion the agents and methods employed depended upon the conditions present, and the treatment should always be adapted to meet the needs of the individual patient. Whether or not digitalis should be employed depended upon the condition of the heart and the type of the disease. He was opposed to employing it in every case as a routine practice, and particularly in the presence of myocarditis. Digitalis caused sturdy contractions of the heart and its injudicious use had caused death in more than one case of pneumonia. When properly given, however, it acted perfectly. It was hard to understand the absence of cinchonism after repeated large doses of quinine as in the treatment described by Dr. Solis-Cohen, and he could offer no explanation. In his experience the use of the blood-pressure apparatus in these cases in private practice had been attended with the marked disadvantage of disturbing the patient and making him nervous, and it was often doubtful whether the information obtained by its use made up for the disadvantages. About all that it was necessary to know could be learned by the rate of the pulse. He commended the use of pituitary substance as suggested by the essayist.

Dr. Albert E. Roussel, Philadelphia, agreed with previous speakers that primary pneumonia should not be classified with secondary pneumonia. Secondary cases due to renal, cardiac, or other disease were bound to do badly and they did not afford a fair test for any method of treatment. For years he had been emphasizing the importance of watching the blood-pressure rather than the temperature in pneumonia. A pulse of 130 to 140 meant a failing heart and low blood-pressure, and the chief indication was to keep the pressure high. The reverse meant disaster. He had considerable faith in digitalis in these cases, having become convinced of its usefulness from studies both in this country and abroad. If digitalis failed, pituitary extract or some of the other drugs that had been mentioned were indicated. Quite recently he had used the treatment described by Dr. Solis-Cohen in 5 cases of pneumonia and the results had been good. The open-air treatment was undoubtedly an important factor. The treatment today consisted not in one drug or measure, but in many, the choice depending upon the conditions present in each individual case.

Dr. George Herbert Evans, San Francisco, said that there was at the present time no accepted satisfactory treatment for pneumonia. In the vast majority of cases the disease went steadily on to one termination or the other, wholly uninfluenced by any method of treatment that might be employed. At present there was but one definite indication in the treatment, the administration of digitalis in embarrassed right heart. The judicious use of large doses often gave relief and made success out of failure. Some time ago he had taken up Dr. Solis-Cohen's treatment with urea and quinine hydrochloride. The result in the first case had been so satisfactory that he had subsequently employed it in other cases, but without the same success. During the last year he had employed pituitary extract alone. His experience with this drug led him to believe that it constituted the most important part of Dr. Solis-Cohen's treatment.

Dr. Francis M. Pottenger, Los Angeles, inquired as to the length of the time required for complete resolution in the average case of pneumonia. We were inclined to think that the process went on rapidly and was completed in a short time, but his experience in the examination of tuberculous subjects who had previously had a pneumonia had led him to believe that the time required for resolution was much longer than was commonly supposed. He also asked what was meant by a large dose of digitalis. He had found 25 drops of the tincture necessary in some cases to produce physiologic effect. The short duration of the attack was a noticeable feature in the

charts shown by Dr. Solis-Cohen. If the disease was due to bacterial invasion, and we could use the proper vaccine, there should be a shortening in the duration of the disease and in the time required for resolution. As regards results, one man obtained one result and another man another with any method of treatment. Success was chiefly due to the observance of minutiæ. It was the same with pulmonary tuberculosis. One man got no result and another obtained a good result from the same treatment. The treatment was the treatment of the patient as well as the disease. Individualization and the observance of minutiæ were the chief points making for success.

Dr. Kolipinski said that in the formula presented by him the corrosive sublimate did not seem to act as a poison. He had given as much as ½ grain of it in twenty-four hours without injurious result. As stated in the paper, a good clinical prognostic indication in the pneumonias was the cough. Little or no cough and scanty expectoration signified a severe case; much cough and profuse expectoration indicated certain recovery. Of course, the kind of case and the complications should also be taken into consideration.

Dr. Morris inquired whether, if the mortality from pneumonia was increasing from year to year, a relationship could not be traced between this and the lessened resistance of the body tissues caused by the invasion of the influenza bacillus. He also asked whether there was any particular significance in the painting of the skin with iodine before giving the injections of quinine and urea, suggesting that this might have some influence upon the chemotactic effect of the injection. He believed that every physician had his own private method of treating pneumonia, but that the particular agents and measures employed did not much matter, so long as they were given with confidence.

Dr. Solis-Cohen, in closing, said that the element of confidence was undoubtedly of the highest importance. As to tetanus, his experience with the injection of quinine in this form had begun 30 years ago, in Dr. Bartholow's clinic, in the treatment of chronic malaria. In all that time he had not seen a case of tetanus and had made over 5000, possibly 10,000, injections. There might be something peculiar in the climate or other special conditions of Indian practice. He had met with just four instances of sloughing, and three of them had occurred before the present technique was instituted, in 1886. Since then he had seen but one case, and that followed an injection given by a nurse. He had always insisted in hospital cases that the injections be given by the internes, but through some oversight it had been given in this instance by a nurse. In his opinion sloughing was due to a corrosive action upon the skin and subcutaneous tissues and, besides painting with iodine, one might, as an additional precaution, cover the skin with a piece of rubber protective and make the injection through that. Usually it was sufficient, however, to empty the syringe thoroughly before withdrawing the needle. The object, of course, was to prevent any drop of the preparation from falling upon the skin. The puncture should be sealed with collodion or iodoform-collodion. According to his observation the necrotic action only occurred upon skin that had been broken, not upon the unbroken skin. The object of the iodine was to prevent local infection in devitalized tissue in case the quinine and urea solution did act badly. Grip infection and the consequent lowering of resistance had undoubtedly played a part in the increased mortality and prevalence of pneumonia. So far as general mortality went, statistics were of value, though, of course, they had no bearing on prognosis in an individual case. There could be no doubt that the general mortality from pneumonia had increased in recent years; the data given in the paper were but a fragment of the available evidence. He believed that this was due in part to therapeutic nihilism and so-called expectant treatment. Many of the patients included in the mortality lists might have recovered under the care of some one with sufficient confidence in his art and his knowledge to institute active treatment. Dr. Pottenger's suggestion that pneumonia not infrequently left more or less lasting consolidation was correct. He believed that intelligent use of the bacterial products would prove of value in preventing this. Under the treatment outlined

in the paper defervescence usually occurred by lysis, rather than crisis. He still observed crisis in mild cases of pneumonia in which the course of the disease was not interfered with. The change from crisis to lysis, and the great relief afforded by the quinine without corresponding change in the local morbid process, indicated that the treatment was antitoxic in character. This view was strengthened by the absence of cinchonism. It would appear that the pneumonia poison and the quinine counteracted or neutralized each other. This tended to prevent cardiovascular failure, one of the most dangerous possibilities of the toxemia. Pituitary preparations, camphor, and cocaine also helped to avert this danger. Each case, however, should be treated upon its own merits. The general routine was a guide; but beyond this, careful individualization was also necessary for success.

PULMONARY SYPHILIS, WITH REPORT OF A CASE PROMPTLY RESPONDING TO SPECIFIC TREATMENT.

By ALBERT E. ROUSSEL, M.D.,

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PULMONARY syphilis, excepting the congenital form in children, is a rare disease. Bronchial catarrh may occur as a manifestation of the secondary stage of syphilis and be alleviated or cured by specific treatment. In the late secondary or tertiary stage gummatous infiltration of the submucous tissue of the trachea and bronchi is not infrequent, with resulting stenosis of the parts. Pulmonary lesions of acquired syphilis belong chiefly to the tertiary stage. Gummata may occur singly or in numbers, vary in size from a hemp seed to a goose egg, and are most commonly found in the interior of the lung and in the lower lobes, thus differing from tuberculosis. Syphilitic bronchopneumonia is undoubtedly a possibility. As to fibroid induration, the following are the changes of this nature that have been attributed to syphilis: (1) Thickening extending from the hilus around the bronchi and vessels; (2) isolated masses of fibroid tissue in various parts of the lung; (3) diffuse changes occupying the whole or the greater part of the lung. Fowler has reported 5 cases of the so-called "syphilitic phthisis."

The case reported by the author was that of a colored female aged 24 who had a distinct history of syphilitic infection, with five miscarriages. The symptoms had been chills, fever, sweats, cough, expectoration, and marked loss in weight. Three weeks before admission to a hospital she was hit on the head, in the right parietal region, with a brick. The wound had been treated, and looked healthy on admission, but since that time the lung symptoms had become more marked; there were severe chills, followed by fever and drenching sweats. The temperature *for weeks* reached 106° and over, and on occasions in the course of several hours would sink to 96⅕°. The expectoration was not abundant, but mucopurulent, offensive, and on one occasion slightly tinged with blood.

Percussion showed scattered areas of dullness over both sides, particularly at the right base. The apices were hyperresonant throughout the case, free from râles, and the seat of supplementary or puerile breathing. Over the dull areas the breathing was bronchovesicular and bronchial in character, vocal resonance increased, and numerous groups of subcrepitant and occasional crepitant râles heard. These signs continued until the ultimate decline in temperature took place, and at a late examination nothing abnormal

could be detected in the chest. The von Pirquet test was applied twice, with negative results. The sputum, examined about a dozen times, was invariably free from tubercle bacilli, pneumococci, streptococci, and elastic fibers.

The condition during the greater part of the first six weeks seemed critical, and death was expected at any moment. The patient on admission had strenuously denied the possibility of venereal disease, and also concealed her numerous miscarriages. Later there developed what proved to be a gumma on the fourth rib of the right side, and at the same time a synovitis of the extensor tendons of the wrist. She was at once placed on inunctions of 2 drams of mercurial ointment and 60 to 80 grains of potassium iodide daily. The results were striking; the fever, symptoms, and physical signs commenced immediately, rapidly and continuously to improve, and she was later discharged cured.

DISCUSSION.

Dr. Thomas E. Satterthwaite, New York, said that at various times he had tried to bring up a discussion of this subject. At first he could hardly get anyone to believe that there was such a disease as syphilis of the lungs. The cases were thought to be instances of pulmonary tuberculosis. The pathologic findings, however, were very instructive,—particularly the white radiations running out from the gumma. The difficulty lay chiefly in the differential diagnosis. Once a diagnosis had been made, the gummata in the lungs and all the symptoms rapidly disappeared under appropriate treatment,—and this was an important diagnostic point. A positive blood reaction was a great help. The discovery of the germ would demonstrate that cases of pulmonary syphilis are more frequent than is generally supposed.

Dr. Pottenger spoke of the difficulty of making a correct diagnosis. The absence of tubercle bacilli from the sputum was not conclusive evidence. Some tuberculous patients but rarely presented bacilli in the sputum. In the case of one patient who had been in 2 sanatoriums for fifteen months the bacilli were detected in the sputum only twice. Their presence could easily be overlooked in such a case unless examinations were made frequently and very carefully. If one were persistent, however, he would be sure to find them sooner or later in many cases which had been considered as negative. The localization of the lesions was not significant. The negative tuberculin test meant nothing. In some cases where he suspected syphilis he found it necessary to use antisyphilitic treatment in combination with antituberculous treatment.

Dr. Osborne spoke of the value of the iodides from a diagnostic standpoint. They were ordinarily contraindicated in pulmonary tuberculosis. If, however, there were no tubercle bacilli in the sputum they could be given, and if afterward no bacilli were found the diagnosis was clear. He had found that, after giving them, the number of tubercle bacilli thrown out in the sputum was increased much as was the case after the administration of tuberculin.

Dr. Evans said that there were affections other than pulmonary tuberculosis that should be taken into consideration in making a diagnosis of syphilis of the lung. In illustration he related a case of a woman aged 35 who had been coughing for a year. There was a growth in the left chest pressing upon the heart, X-ray examination showing a mass that took up the mediastinum and extended over on the right side, compressing the lung. No tubercle bacilli in the sputum. One enlarged gland in the right supraclavicular region; glands in both axillæ. Liver enlarged. History of 4 to 5 miscarriages. Husband denied lues. In spite of negative Wassermann, the clinical picture suggesting syphilis, the patient was treated accordingly, without success. Examination of the supraclavicular gland which was removed showed that the growth was a lymphosarcoma.

Dr. Morris said that there was still another affection that should not be overlooked in making the differential diagnosis. In illustration he related a case that was first diagnosed as tuberculosis of the lungs, then pulmonary syphilis, and which finally turned out to be a case of blastomycosis.

Dr. Satterthwaite said that in the early stages it was almost impossible to differentiate between pulmonary tuberculosis and pulmonary syphilis.

Dr. Pottenger had not found potassium iodide harmful in tuberculosis. He had used it in a great many cases and often found it beneficial. His employment of it had been more particularly in advanced cases.

Dr. Osborne said that in incipient cases, according to his experience, the iodide was liable to stir up the pulmonary condition and make matters worse. He recollected in particular one such case in which the use of potassium iodide was followed by a lighting up of the symptoms and a change for the worse. In chronic cases the effect was somewhat similar, but it enabled the patient to expel the bacilli.

Dr. Roussel, in closing, said he was aware that the absence of tubercle bacilli did not exclude pulmonary tuberculosis; in fact, he had taught for years that if the diagnosis was postponed until the presence of tubercle bacilli in the sputum could be demonstrated, a large percentage of the patient's chances for recovery had been lost, but in a case presenting the marked and advanced physical signs which had been noted in his patient and with many repeated examinations of the sputum, which had been invariably negative regarding tubercle bacilli, particularly at the time she was taking large doses of potassium iodide, the conclusion must be absolutely against tuberculosis. This was confirmed by the very rapid recovery which had occurred since, and was being maintained. He had no doubt that the woman had syphilis of the lungs, and this was also the opinion of his colleagues. Moreover, there was no question that she had presented all the symptoms and physical signs of bronchial pneumonia, lasting over a period of four months. At present the woman's chest was normal. He did not believe that such a result could have been obtained within this period of time in any disease other than syphilis.

RECOVERY IN A CASE OF INFLUENZAL MENINGITIS COMPLICATED BY PNEUMONIA.

By THOMAS E. SATTERTHWAITE, M.D.,

NEW YORK, N. Y.

THE nervous phenomena which are occasionally features of the acute stage of influenza include neuralgias, functional disorders of the special senses, meningitis, cerebral or cerebrospinal, and psychic phenomena such as hallucinations, delusions, or even mania.

Most of the cases have been in children, whose delicate nervous system appears to render them especially sensitive to the toxins of the disease. The characteristic gross lesions consist of a series of minute hemorrhages scattered throughout the system. If an extravasation becomes infected by any of the pus-producing organisms, the prognosis is most unfavorable.

The influenza bacillus, though it may not always be found *intra vitam* in the blood or secretions or even by lumbar puncture, will usually be recovered at post-mortem examination by diligent search, though it may be associated with other micro-organisms, such as the pneumococcus or streptococcus, or may be replaced by them.

The poison may invade the meninges by extension, as from an otitis media or from abscess of a sinus; by metastasis, or by general infection of the blood by toxins.

Influenzal meningitis is usually ushered in by violent headache, especially frontal and nuchal; facial neuralgia, and photophobia. There are apt to be also irregular contraction of the pupils, muscular spasms, delusions, unconsciousness, etc. At first there is a high pulse rate, perhaps with arrhythmia. In the early stages the patellar or ankle reflexes are often exaggerated. Later, if there is effusion into the ventricles or at the base, there is loss of these reflexes, relaxation of the pupils, stupor, and slow pulse. There appears to be a moderate leucocytosis at this stage. In from 6 to 10 per cent. there is said to be albuminuria. There appears to be seldom any diminution in the number of red cells, or in the amount of hemoglobin, both of which may be increased.

The author collected a series of 44 cases of all ages, with a mortality of 20 per cent.; in a second series of 30 cases, all adults, there was a mortality of 29 per cent. The prognosis is very different when to influenzal meningitis pneumonia is added. Usually the pneumonia is of the bronchial form. In the case reported by the author there seemed to be a mingling of the lobar and lobular forms. It started apparently as an extension of a bronchitis, and in the right lower lobe when first detected there was apparently a central lobular pneumonia. In the left upper lobe the deposit occupied most if

not all of the lobe, and presented the usual physical signs of the lobar form. The temperature curve was also that of lobar pneumonia. Defervescence occurred on the seventh day. Of 6 cases of influenzal meningitis with pneumonia collected from the literature, 5 died, while in the sixth there was an incomplete cure, the patient suffering for two years from aphemia and showing mental deterioration. The author's case is the only recorded instance of a full recovery in influenzal meningitis with pneumonia.

Lumbar puncture was not practised in this case. Bromides in massive doses, with cold applications to the head, gave relief from the nervous symptoms. The blood-pressure never exceeded 110, and was at first below that figure. Milk, with Vichy water, plain water, or albumin water, and yolk of egg were practically all the nourishment used during the acute stage. Vitality was maintained with strychnine and hypodermic injections of camphor. The usefulness of hexamethylenamine was not evident. Temperature was lowered by the cool bath, when it exceeded 103° F. The room was maintained at 65° to 68°, with an abundance of fresh air. In general, the treatment was symptomatic.

DISCUSSION.

Dr. F. E. Stewart, Philadelphia, said that in looking over the literature of pneumonia it had occurred to him that the word "diseases" could easily be omitted and the cases classified as infections. Dr. Satterthwaite's case appeared to be an instance of infection in which the lungs and meninges were particularly affected. Some authorities recommended the use of camphorated water instead of the oil. He would like to see more study along this line. Camphor was absorbed more quickly in aqueous solution, but less of it was taken up by the body.

Dr. H. B. Anderson, Toronto, reported 2 cases of meningitis due to influenzal infection: (1) Student; had suffered for some years with ear trouble, but of late it had been quiescent. He was suddenly taken down with grip, soon developed violent headache, restlessness, and delirium, and died after a few days. The site of infection was probably the ear. (2) Woman, 45; taken down with influenza of the ordinary type. While she was improving, there suddenly developed marked symptoms indicative of meningitis,—headache, delirium, and unconsciousness. The patient died after a few days. Lumbar puncture had failed to disclose the organism, or give any definite information. The case was apparently one of meningitis complicating influenza, the infection having probably entered through the ear. The patient had previously suffered from transient ear pain and examination had disclosed evidences of a mild inflammation of the drum.

Dr. Satterthwaite, in closing, said he believed that the case was one of grip infection, the pulmonary and meningeal infection being secondary. There was no need of lumbar puncture, as the diagnosis was clear. His experience with camphor in cases of this kind had been very satisfactory. One of his patients had obtained so much relief from it that it was repeatedly asked for, and given continuously for weeks.

CLIMATIC CONDITIONS IN CALIFORNIA: THEIR INFLUENCE ON THE TREATMENT OF TUBERCULOSIS.

By GEORGE H. EVANS, M.D.,

SAN FRANCISCO, CAL.

That the value of climate as an aid to the treatment of tuberculosis is to be considered of subsidiary importance in the list of essentials must, I believe, be conceded by all who have had the opportunity of observing results anywhere in the civilized world where intelligent scientific treatment of tuberculous patients has been carried out. That discrimination in the choice of climate must be exercised in considering the conditions most favorable to healing in certain cases is freely admitted. That sociological and economic factors must be duly weighed in deciding upon the abode of the majority of these patients must also be remembered. It has been abundantly demonstrated that in any climate permitting hygienic out-of-door living, satisfactory results are possible of attainment, and it can safely be asserted that, regardless of climate, satisfactory results in the treatment of tuberculosis, wherever treated, are in direct proportion to the intelligence, skill and painstaking, constant surveillance of the patient, without which no climate, however favorable, can be reasonably expected to produce good results. As Wolff has well said: "Das Wie in der Behandlung wichtiger ist als das Wo."

It is therefore not the purpose of this paper to extol any climatic peculiarities of California, but rather to give a brief description of the conditions there, in the endeavor to lay before those interested a few facts, which, judging from my experience with medical men living in parts distant from California, are not commonly known. The necessity for this is the more apparent when we see constant evidence of the fact that those who send patients to California, and many of those who write modern textbooks, are generally either ignorant of the area and topography of that State, or have failed practically to apply the facts with which they are conversant. Thus the advice is frequently given to go to California, with the inference that it is a spot where a certain climatic feature exists, and none other. The apparent differences of opinion as to what that feature is become bewildering when one authority compares it to the high, arid regions of the southwestern sections of the United States, another to the balmy, marine climate of the Riviera, another to the desert of Egypt, while still others liken it to the mountainous regions of Switzerland or the high altitudes of Colorado. The cause of this confusion is apparent to one acquainted with the topographical features of the State, for probably nowhere else in the world can a single section present those varied features of climate peculiar to all the localities named.

A brief description of the geographical position and extent of California can best illustrate this. The State extends approximately from latitude 32 degrees north to latitude 42 degrees north, with a mean length of nearly 800 miles, and an average width of about 200 miles. It will thus be seen that all of France, all of Italy north of Rome, and half of Spain lie north of the northern boundary of California. It has an area of 158,360 square miles, nearly equal to the combined areas of the New England States, New York, New Jersey and Pennsylvania. In this State are situated the highest and lowest points in the United States proper; Mount Whitney, with an altitude of 14,522 feet, at the one extreme and Salton in the Colorado Desert, 263 feet below sea level, at the other. Between these extremes exist variations in altitude and climatic conditions presenting features of the greatest imaginable diversity.

In a consideration of the controlling factors responsible for the climate of California one must consider, first, the movements of the great continental and oceanic pressure areas. Under this head is included also the most active factor in climatic development, namely, the movements of individual pressure areas, since there is now good ground for believing that the paths of these individual disturbances—large-sized whirls and counter-whirls—are largely determined by the general relations of the permanent pressure areas. The second factor is the prevailing drift of the atmosphere in temperate latitudes from west to east. Thirdly, the proximity of the Pacific Ocean, with a mean annual temperature near the coast line of about 55° F., is an important factor. It is a great natural conservator of heat, and is chiefly responsible for the moderate range of temperature along the coast from San Diego, at the south, as far north as British Columbia. The fourth factor is the exceedingly diversified topography of the country for a distance of 200 miles from the coast inland.

The topography of California can be roughly described as mountainous, with a central valley about 400 miles long and from 50 to 60 miles wide (the latter forming the chief agricultural district of the State). The Sierra Nevada mountains form the eastern boundary of this valley, gradually rising to a height of from 8500 to 14,000 feet. The coast range forms the western boundary, and consists of two or three parallel ranges from 3200 to 5000 feet high. These two ranges are merged into each other north and south by connecting ranges which present this great interior valley as an immense basin, the boundaries of which are broken only by the break in the coast range where the two great rivers of the valley flow into San Francisco Bay, and through which the prevailing westerly breezes blow from the ocean, influencing so much the climate of this great valley. The Sierra Nevadas are continued south at a less elevation, forming the eastern boundary of a beautiful section of the State known as Southern California.

In considering climatic conditions in California from the standpoint of the tuberculous, it must be remembered that because of its sparse population (2,686,291) only certain developed sections can present those conditions which make it possible for the tuberculous sufferer to receive the

comforts and scientific care necessary for his intelligent treatment. The high altitudes of the State do not present these conditions. The beautiful regions surrounding the Yosemite Valley and the glorious lake regions of the High Sierras are used only as summer resorts, and are accessible only at that season. The dry desert regions of the State have not reached a stage of development where the ordinary comforts of life can be offered to invalids. The State richly abounds, however, in sections where either the features of marine climate or those of valley and moderate altitude can be presented, and where everything necessary to the intelligent and scientific treatment of the tuberculous can be obtained, together with certain unique features which I believe go to make these sections garden spots that cannot be found elsewhere in the United States—features conducive to out-of-door living which are necessary to secure that hearty co-operation on the part of the patient so necessary for successful treatment.

Considering first the climate of the coast, one is impressed by the uniformity of temperature along the entire coast line from north to south, showing, as it does, a difference of but ten degrees Fahrenheit in the mean annual temperature. San Diego, at the extreme south, has a mean annual temperature of 61° F., while that of San Francisco is but 5 degrees less, though it is distant from San Diego 600 miles. The two factors modifying this coast climate are the prevailing easterly drift of the atmosphere, causing the well-known winds from the west, and the proximity of that great body of water, the Pacific Ocean. The popular impression that the warming influence is due to the Japanese Current has no scientific data for its support. This modifying influence, together with certain topographical peculiarities in the coast line, afford localities possessing climatic characteristics similar to those of the Riviera. The best known of these are probably San Diego and Santa Barbara, which will be briefly described.[1]

In addition to the conditions mentioned above as influencing the coast climate, the proximity of the great Colorado Desert on the east, separated from San Diego by a range of mountains, must be mentioned in considering that section. Probably few spots on earth possess the equable climate of San Diego, where there is practically absence of both hot and cold weather. The temperature has exceeded 90° F. nineteen times in thirty years, and four times in the history of the Weather Bureau Station it has touched 32° F., but it has never fallen lower. In 1910 the monthly mean temperature for January was 52.2° F.; for July, 67° F. The mean annual temperature covering a number of years has been 61.4° F. Because of its proximity to the ocean, the humidity is high, amounting to 78 per cent. The desert winds are responsible for temperatures exceeding 90° F., which are necessarily accompanied by a considerable lowering of the humidity. The average yearly rainfall is nine and one-half inches, and the records show an average of only four days each year without sunshine.

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[1] The figures here given regarding temperatures, humidity, etc., have been obtained from the Reports of the United States Department of Agriculture as compiled by Prof. A. G. McAdie, in charge of the Weather Bureau of San Francisco.

San Diego presents excellent facilities for the treatment of those cases of tuberculosis complicated by dry catarrh of the upper respiratory passages, tuberculous laryngitis, kidney complications, and most of the cardiovascular affections.

Santa Barbara lies considerably farther north on the Southern California Coast—a beautiful city of homes encircled by foot hills, except to the south, where it faces the sea. It possesses an annual mean temperature of about 60° F., and, while the average daily variations are somewhat higher than those of San Diego, the temperatures of the winter and spring months approximate 56° F., and those of the summer and fall months rise only to 63° F. The average humidity is 71 per cent. The number of clear days in the year amounts to 241. Santa Barbara possesses, therefore, those climatic qualities suitable for the treatment of such cases as have been mentioned under the description of San Diego.

It is in the opportunities for the reception of patients suitable for treatment in the valley and low mountain regions that California presents its chief claim as a resort for the tuberculous. Both Southern and Northern California abound in such regions, where pure air, free from germs and dust, moderate humidity, freedom from wind storms, maximum amount of sunshine, and moderate temperature the year round, make possible and pleasurable the open-air treatment of tuberculosis at all seasons of the year. It would be impossible in a communication of reasonable length to attempt a description of all these sections, and, indeed, it scarcely seems necessary, for they all more or less partake of the same characteristic climatic qualities, save that in the northern and central portions of the State the precipitation is greater, and the sunshine has a peculiar "soft" quality in contradistinction to the glare which is present in the south. Strange to say, this is a quality which has not been dwelt upon by those writing on climatology, and I believe its sedative influences have not been sufficiently recognized.

Probably the best known locality is Los Angeles and its vicinity. The city is located in a valley eighteen miles from the ocean. The prevailing wind is west, which, coming from the ocean, causes the humidity to average high. Morning fogs are frequent from the spring to the autumn, but they disappear in the early forenoon. Los Angeles has an average annual temperature of 62° F., with an average daily range of 22° F. Its annual mean rainfall is 15.71 inches, and it has an average of 317 clear days in the year. In its immediate environs may be found many places at altitudes of from 500 to 2000 feet where all the advantages for treatment exist for that large class of patients unsuitable for high mountain sections—which class, after all, probably constitutes the vast majority of the tuberculous.

San Francisco is a city famous for many things, not the least of which is the peculiarity of its climate. By reason of its unique situation with respect to ocean, bay and mountain, a strange mixture of marine and continental climates is here found. Winter and summer are purely relative terms. The mean annual temperature is 56.1° F., with a difference of only 10° F. between the average maximum and minimum. The annual precipitation

is 22.75 inches. The summer months are dry, save for the fog which is driven in from the ocean almost every afternoon during these months by the prevailing westerly winds, and which contributes so largely to the modification of the climate of San Francisco and also that of the entire central portion of the State. The climate can best be described as bleak. The humidity is naturally high, and the average number of clear days is but 185. It must therefore be freely admitted that such a climate does not seem conducive to out-of-door living; but for tuberculous cases uncomplicated by asthma and bronchial affections with much secretion I have found the stimulating effects on metabolism of this climate of great therapeutic value, and have repeatedly seen chronic fibrous processes which had remained stationary elsewhere advance favorably under the tonic effects of the bracing San Francisco climate. During the winter months, while the rains are sometimes heavy, San Francisco is practically free from the heavy fogs and the strong westerly winds, making these months by far the most desirable for out-of-door living.

The modifying influence of the ocean winds and fogs through the Bay of San Francisco is productive of climatic conditions in innumerable valley and low mountain localities in the vicinity of San Francisco which offer unsurpassed opportunities for that large class of moderately advanced cases with lowered resistance—cases which in my experience do not do well in the stimulating yet rigorous climate of resorts at great altitudes. Here are also to be found all those comforts and essentials of a well-developed civilization which, together with equable temperature conditions at all times, moderate humidity, and maximum amount of sunshine, rob out-of-door living of all the unpleasant features of the rigorous winter climate of the Eastern States. It would take a study in detail of the topography of the land surrounding San Francisco and its wonderful bay to explain the great differences in climatic conditions between the city and these sheltered spots in its immediate vicinity. The limitations of this paper will not admit of such a description. It is a fact, however, that one can reach, in an hour's journey from the city, valley and low mountain localities which are absolutely free from the winds and fogs of San Francisco, and where the influences of these factors only modify and make delightful living conditions in these favored sections.

This communication would not be complete without a word of warning regarding industrial conditions in California. The sparsity of population conveys the natural inference that California, in addition to its climatic advantages, offers facilities for all sorts of light employment for the ambulant tuberculous. California invites and encourages the immigration of colonists physically and pecuniarily equipped to develop and till its vast areas of land, which only await the touch of the magic wand of irrigation to cause them to burst forth into wonderful agricultural productiveness. On the other hand, one of the most pathetic scenes that is to be daily seen on the streets of all its large cities is the number of unemployed tuberculous hopelessly looking for relief in localities as overcrowded industrially as are such cities

elsewhere, where only the physically fit are needed, and where the supply of labor usually exceeds the demands. The necessity of emphasizing this statement is apparent from the large number of patients without adequate funds who are sent to California annually by physicians, throughout the country, who have no knowledge of industrial conditions there. The sad result of this thoughtlessness is seen in the high mortality records from tuberculosis in the floating population, particularly in the Southern California counties. California offers no opportunity for the tuberculous mendicant.

In conclusion, I desire to protest against a custom altogether too prevalent, despite all that has been said and written upon the subject, namely, that of sending tuberculous patients to favored sections anywhere without regard to the necessity of constant medical guidance by those specially trained. It is to be hoped that the day will soon come when the truth of this statement will be so impressed upon the minds of medical men everywhere that the relative value of climate and skilled medical care will find their true adjustment; when, with tuberculosis as with other chronic diseases, provision for proper medical care will be the first consideration in sending these sufferers from home.

After all the controversy that has been waged over this subject it is indeed interesting, in reviewing the literature covering the past ten years or less, to note that, almost without exception, those who emphasize the importance of climate as the great factor in treatment are those who live at health resorts. It is but natural that such men as Lawrason Brown, quoting Sandwith, should say: "Become early inoculated with the microbe of universal belief in the place in which they live."[2] It is readily admitted that in the progress of a disease as chronic as tuberculosis, in which so many different factors enter into and influence the treatment, it is exceedingly difficult to give each its proper place. The selection of a suitable climate, based upon a careful consideration of the needs of the individual case; a proper correlation of rest and exercise; proper attention to the nutrition of the patient; tuberculin—all are important factors in therapy. No amount of theoretical argument, however, as to the specific value of any climatic quality in any place can weigh for a moment against the abundant testimony of successful treatment obtained by men trained in the handling of these patients, regardless of the locality in which they live.

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[2] Osler's "Modern Medicine," vol. iii, page 392.

WHAT DOES TREATMENT OFFER TO THE ADVANCED TUBERCULOUS PATIENT?

By FRANCIS MARION POTTENGER, A.M., M.D., LL.D.,

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THE keynote of success in the treatment of all disease is early diagnosis and early application of the proper therapeutic measures. In spite of the fact that medical science has been able for the past fifteen years to offer an apparent cure to three out of every four patients suffering from tuberculosis, provided the diagnosis is made early and the proper treatment immediately instituted, yet we find a great many patients presenting themselves for treatment who are in the advanced stages of this disease.

It is well for us to examine into the causes which contribute to this unfortunate state of affairs. I have often said that there is a time when every patient suffering from tuberculosis can be cured; but of those patients who present themselves to us for treatment, it seems, from the average statistics of those who are making the best records in the treatment of tuberculosis, that about 20 to 25 per cent. are unable to secure a healing. Therefore if my first statement is true, we must face the fact that our early diagnoses are being made too late in from 20 to 25 per cent. of cases. If we take this as the measure of the necessary mortality of early clinical tuberculosis, we can see that there is still a great percentage of patients who are unnecessarily passing on to an advanced hopeless stage. We will admit that there is a certain number of patients who, owing to the peculiar pathology of the disease, arrive at an advanced stage without knowing it; but this does not account for the larger number who develop recognizable symptoms which are either neglected by the patient or unrecognized by the physician until a serious condition presents itself.

The responsibility for early tuberculosis reaching an incurable stage must be borne by both the patient and the physician. Patients are inclined to neglect the early symptoms of this disease either through ignorance or through an attempt at deceiving themselves. Quite a percentage will not present themselves for examination during the early curable stage, and there is quite a percentage who, if they do have a diagnosis made, will not accept it. I fear, however, that the medical profession itself must really assume a good deal of this responsibility. Too often a patient suffering from the early symptoms of tuberculosis seeks medical advice, and, instead of an examination and diagnosis being made, the patient is given some palliative remedy which will relieve the most prominent symptom. I often have patients tell me that they have begged and implored the physician to examine their chest and were greeted only by

laughter at the idea of the presence of tuberculosis; and numerous instances have come under my observation where the patient collected the sputum and took it to the doctor and forced him to have it examined, and then, when bacilli were found, in order to conceal his negligence, he usually told the patient that the examination showed that "there was not very much," but that "there was a little tuberculosis present." It would seem to me that if the modern physician could do nothing more for a patient where tuberculosis might be suspected, he could at least have any secretion that might be present examined microscopically. While I do not consider this the most important step in the early diagnosis of tuberculosis, I feel sure that it would save a great many patients from going on to a hopeless condition, because it would help to make the diagnosis far earlier than it is now being made.

There is one type of clinical tuberculosis that we meet quite often which almost precludes an early diagnosis. It is the type where the patient becomes ill suddenly, probably without any previous warning, following a cold, a bronchitis, pneumonia, influenza; or, it may be without any of these inciting factors, for some unaccountable reason, a process which had previously been dormant suddenly becomes active. Under these circumstances a truly early diagnosis could only have been made months, or it might be years previously, when the infection took place, or when it first began to manifest clinical symptoms. These cases usually present themselves to us with a sudden onset, showing a marked rise of temperature, considerable cough and expectoration, and symptoms which usually attend a markedly acute process. Some of these patients seem to be doomed from the beginning. No matter what we do, they cannot be helped. On the other hand, a considerable number of them, if put on proper treatment at once, can again be brought to a state of arrest in the disease.

Advanced tuberculosis will continue to be prevalent until there is a closer association between family physicians and their patients, and until the laymen learn that a thorough examination is necessary in order to detect this disease early. While it cannot be said that clinical tuberculosis is ever easily cured, yet, if the proper treatment is instituted when the early symptoms first appear, and if the patient will follow the prescribed course for a sufficiently long time, as large a percentage of patients suffering from this disease can be restored to health as in the case of any other serious malady. But if the disease is allowed to progress, a very important advantage is lost.

Owing to the peculiar pathology of tuberculosis the disease becomes progressively more difficult to handle as it advances. The small tubercles which characterize the disease in its incipiency are easily reached by the circulating blood, which carries with it the substances necessary to the production of healing. Later, however, this condition changes, the centers of the tubercles soften; they mass together and form large foci of caseation; the blood no longer reaches the inner portion of the mass, and the bacilli which are therein enclosed multiply, comparatively uninfluenced by the protective substances which may be freely circulating in the blood without the tubercles. While the early tubercle is comparatively easy to heal, the centers of caseation are

influenced slowly and removed with difficulty. These cheesy masses may be small, almost microscopic, or they may become so large that they occupy an extensive pulmonary area.

When we attempt to heal advanced tuberculosis we are trying so to fortify the patient that all danger of spreading of the disease to new tissues will be removed and so to stimulate the tuberculous tissue that those areas which are not necrotic will be transformed into scar tissue, while the caseous masses will be separated and thrown off, and the remaining ulcerating surfaces heal. This is a difficult task, but one which can often be accomplished if sufficient time is expended.

Not only is the healing of tuberculosis difficult because of the peculiar pathological features of the specifically involved tissue, but also because of the manner in which the disease affects the other organs and systems of the body. Here again, the difficulties increase with the advance of the process. While the nervous, circulatory, digestive and muscular systems, as well as all organs of the body, are influenced early in the disease, later they suffer a distinctly serious derangement. As the extent of the lesion increases, and more and more of the pulmonary tissue becomes involved, the blood is oxygenated with greater difficulty, and, as a result, all of the tissues of the body suffer a deterioration which counts greatly against the patient in fighting the disease.

Another factor in the deterioration of tissue and the impairment of functions of the various organs is the toxins which are given off from the tubercles. These are not all due to the bacillary process itself. The bacillary toxins are important, but added to them we have the toxins which result from the disintegration of the tuberculous tissue and those which result now and then when other bacteria complicate the process. The rôle supposedly played by mixed infection seems to be gradually lessening, and we now look upon toxemia from the first two sources mentioned as being the one which must be considered in every case that has advanced beyond the earliest stages.

The heart has a peculiarly difficult rôle in advanced tuberculosis. In the first place, it is called upon to do extra duty. It is obliged to force the blood through the more or less diminished pulmonary areas, and at the same time is reduced in its ability to perform work. It suffers from the general disturbance in oxygenation, and its muscle is weakened by the toxins; its nerve supply is also influenced by these same factors and shows the same peculiar irritability that marks the nervous system in general in this disease. Added to this are the compensatory changes which occur between the two lungs as a result of the contraction of the areas most severely diseased and the enlargement of the portions that are relatively healthy. The mediastinum is displaced, the heart is drawn over to the side of greatest contraction, unless it is bound down by adhesions, and in either case it is obliged to work at a great disadvantage. In spite of this and in spite of the abuse to which the organ is usually subjected through overexertion by the average advanced tuberculous patient, the heart usually bears up well. It must be understood, however, that the heart in advanced tuberculosis is usually working on its reserve power; hence should be especially favored until it has become fully adjusted to the new conditions surrounding it.

The disturbances on the part of the digestive system are extremely interesting. They are very complex from the standpoint of causation, and in their severest phases are exceedingly difficult to overcome. The secretory, motor, and absorptive functions of the digestive tract, as well as the further elaboration and final assimilation of the digested food, are all deleteriously influenced. In small lesions the amount of disturbance is slight, but in advanced cases we find, among others, the following factors each contributing something toward the prevention of a normal harmonious action: The effect of deficient oxygenation; the effects of the various toxins upon secretion and motility; the reflex stimulation of the vagus, due to the fact that the respiratory ends of the vagus are irritated by the inflammation in the lung; the disorder of function due to the disturbance in the action of the diaphragm; and the effect produced by the lack of cell tone and general muscle waste.

The nervous system is profoundly influenced through both the general toxemia and the general cellular disturbance which affects all organs. Aside from this, there is a direct influence on all nerves that come in direct connection with the nerves supplying the inflamed lung, producing such symptoms as hoarseness through the recurrent laryngeal, digestive disturbances through the gastric portions of the vagus, and the disturbance of the heart through the cardiac portion of the same nerve. Then, there is another phase of disturbance shown reflexly in those nerves which take their origin from the same segments of the cord that receive impulses from the sympathetics supplying the lung. The changes in these nerves sometimes amount to a true neuritis, and the effects are shown in sensory, motor and trophic changes in the parts supplied by them.

The muscular system suffers owing to deficient oxygenation, also from toxemia and as a result of the disturbance of the nerves supplying it. All of the important organs of the body are likewise disturbed in their function.

With the above picture of advanced tuberculosis before us we might be inclined to think that the prognosis is universally bad, but such is not the truth. While, of course, these cases are difficult and throw many obstacles in the way of cure, at the same time it is remarkable to see what can be done even in these advanced cases with patience and perseverance. Unless the patient is *in extremis* the chances of an arrest of the disease are very good, even though the case be advanced. If he cannot obtain a healing, he may be freed from annoying symptoms, and be privileged to live anywhere from many months to many years. Whether or not this will occur depends largely upon the intelligence of the treatment and the co-operation of the patient.

It is in the treatment of advanced tuberculosis that the physician's ingenuity is taxed to its limit and the patient's co-operation is put to the severest test. With the heart, the digestive system, the nervous system, and, in fact, the entire body burdened as I have mentioned above, the problem is far from being an easy one; nevertheless the reactive force of the human economy is such that it often comes to the rescue of these patients even after the body has been severely taxed. It is not sufficient to apply the correct treatment, but it must be applied under ideal conditions. If there is any

form of tuberculosis that should be treated in institutions, it is the advanced form. These patients for the most part become more or less neurasthenic. They are inclined to be irritable at times; they have all kinds of complications, first on the part of one organ and then on the part of another. To handle these successfully, half the battle has been won when the patient is taken away from his home and surrounded by trained attendants. The treatment in advanced tuberculosis consists, first of all, in creating an atmosphere of hope and optimism; surrounding the patient with a spirit of cheerfulness and determination to get well; placing him in such a frame of mind that he will co-operate freely and do the things that are essential to cure. This psychic effect is seen in all instances in which patients are put under treatment in which they have confidence. It is a rule for patients entering a sanatorium to sleep well, although previously they had been spending restless nights; to have better appetites; to become less nervous, and to take upon themselves a feeling of well-being which they have not previously experienced. This comes before there has been any opportunity for the treatment to do good, and is simply the result of a better mental state. This is the same thing that the newspapers reported in nearly all instances where the Friedmann vaccine was used. Such announcements do not mean much to the physician who is accustomed to treating these patients, because he sees it constantly. The improvement of the pathological condition is a much slower process and requires not hours, but weeks, months, and oftentimes years for its completion.

The second factor in the treatment of tuberculosis is a careful *régime* suited to the individual and carried out for a long time. What I mean by careful *régime* is not a routine method of treatment, but a method of treatment devised after the patient has been carefully examined, and after all the various factors that are contributing to his physical deterioration have been studied.

It must also be borne in mind that tuberculosis is a chronic disease. The changes which take place, whether the patient goes on to a cure or whether he goes down to dissolution, are slow. Failure often comes from giving up too soon. There is no necessity for giving a hopeless prognosis and ceasing our endeavors on behalf of the patient as long as he is able to digest and to assimilate food and the heart is capable of performing its functions. I have seen patients after running an elevated temperature for many months finally reach normal after the diseased tissue had been destroyed and cast off, and then regain their strength and weight and attain to a degree of health that seemed impossible. To obtain such results has often taken many months, but the time expended was well worth it. I remember several instances in which, had we interrupted treatment at the end of nine months or a year, we would have failed, but, by keeping up the treatment, at the end of two years we had an arrested condition and a renewed lease on life.

In the management of these advanced cases, aside from optimistic suggestion, I would urge two lines of therapy. These patients should be in the open air. Every organ and system of the body should be studied carefully. The heart, the alimentary tract, the respiratory passages, the nervous system

should all be painstakingly looked into, and wherever there are difficulties these should be corrected if possible. Good food should be supplied and a most careful hygienic *régime* instituted. These factors act directly upon the patient. They increase the activity of his cells; they enable him to respond better in providing a proper defense. Another important measure in treating these cases is tuberculin. As I mentioned in my recent book, "Tuberculin in Diagnosis and Treatment," "While I have been an ardent supporter of tuberculin, I have always reinforced it by every measure that would improve the physical and mental condition of the patient. The injection of tuberculin is not treating tuberculosis. Tuberculin acts only on the tuberculous process, and thus affects the general well-being of the patient indirectly; general hygienic and tonic measures and those which improve the mental condition of the patient, on the other hand, affect every organ and function of the body, and act upon the tuberculous process indirectly. The two are supplementary and both essential to best results."

While there is serious objection to inexperienced men treating these advanced tuberculous patients with tuberculin, I am sure that those who have had experience in the use of tuberculin and in the treatment of tuberculosis should be able to use this remedy to their great benefit. The treatment of the advanced tuberculous case with the expectation of producing a good result requires care, patience and extremely good judgment. It is a problem, not for the general practitioner, but for the specialist in tuberculosis. I desire to make it clear, however, that even advanced tuberculosis is not beyond hope. Practitioners in other fields do not give up a patient because he is seriously ill. When called to a case of typhoid fever when the patient is extremely low, the efforts are doubled, that a cure may be brought about. When a surgeon performs a serious operation he uses greater caution than he would if it were a simple case. So must it be in the treatment of advanced tuberculosis. The difference here lies in the fact that tuberculosis is a chronic disease; the effort must not be made for a day, for a week, or for a month, but for many months and sometimes years. The time is long, the difficulties and discouragements are many, but when life has been prolonged or healing attained the repayment is ample for both physician and patient.

DISCUSSION OF THE PAPERS OF DRS. EVANS AND POTTENGER.

Dr. Spencer L. Dawes, Albany, heartily agreed that the physician should see that his patient received individual medical attention. It was not sufficient to send these patients to California or Colorado, or elsewhere. If one had to choose between care without climate and climate without care he would do well to choose care without climate. Each patient should have individual treatment.

Dr. F. E. Stewart said he was also of this opinion. He had visited Dr. Pottenger's sanatorium, and could testify that much of his abundant success was due to the careful personal attention that he gave the patients individually.

Dr. Osborne expressed appreciation of the papers presented. He agreed with Dr. Pottenger as to the value of tuberculin. Latent tuberculosis was always with us. One way to lessen the number of cases was to secure an earlier recognition of and give proper treatment to possible acute cases. Every patient recovering from pneumonia, typhoid or other diseases, and even those suffering from slight debility, should be care-

fully watched. In tuberculosis one should never give up. Recovery had occurred in cases that had seemed absolutely hopeless.

Dr. J. W. Chappell, Washington, D. C., agreed with this. The physician could learn a lesson from the very persistence with which these patients held on to life. They lived along from year to year and some of them managed to recover even when left alone. Several years ago he had noted that one lung of an apparently healthy man, whom he was examining, was inactive. Inquiry disclosed that twenty years before, the man had had "lung trouble" but had recovered without treatment. Tuberculous patients should never be given up. The endeavor should be to see that each one received careful personal medical attention. As to incipient cases, whenever he had a patient who was running down steadily without any *known* cause he strongly suspected tuberculosis.

Dr. John Blake White, New York, emphasized the importance of an early diagnosis and treatment. The recognition of the disease in its incipient stages required careful study. Any symptom or manifestation that might point to tuberculosis should be carefully noted, and the warning heeded. Once the diagnosis had been made in the early stage, and the proper treatment instituted, the outlook for the patient was more favorable in many cases. He regarded the careful observation of the thermic bodily changes as an important clinical feature of early tuberculous advance, for this symptom was the first and great distinctive clinical evidence present, when respiratory conditions could be discerned only by the most skilled auscultation. In some instances even this would not reveal the presence of an insidious tuberculous invasion.

Dr. Kinyoun said that the management of tuberculosis was a nice problem. It took two to make a bargain. The physician could make the diagnosis and prescribe the treatment, but it rested with the patient to carry it out. There was no doubt as to the importance of early treatment, but as a matter of fact it was seldom that an incipient case came to the attention of the physician. He had enjoyed Dr. Evans's description of the California climate and conditions. Even the climatic treatment of tuberculosis, however, had its limits. All of the patients could not be "turned out to graze." If they could, the population of some of the Western States would be like that of Nebuchadnezzar's ancient Babylon. Some patients, especially in the later stages, were best treated at home. He had seen patients in the late stages of the disease go to California and melt away in a short time. On the other hand, the disease could often be arrested in its earlier stages. But any form of treatment that failed to restore the patient to his former physical condition fell short; for example, one that only enabled the patient to live and do light work in the place to which he had been sent, but not to return home, was a mere apology for a cure. All cases were not suitable for treatment away from home, but whether at home or elsewhere the patient should have careful medical attention.

Dr. Morris inquired whether physicians had experienced any difficulty in getting tuberculous patients to take treatment early on account of the euphoric state characteristic of the disease. Surgeons were accustomed to send some of their patients (with tuberculosis of the knee, for example) to an altitude of three thousand or four thousand feet, and then to the sea-shore, and then to the mountains again, keeping this up for the beneficial effects upon the blood, circulation, and the hyperleucocytosis which followed changes in elevation, but so far as he knew this method had not been adopted or discussed by medical men. He requested information upon this point.

Dr. Pottenger said that the important point in every case was personal treatment and individualization. Skilled personal treatment was the desideratum wherever the patient might be. Many patients did better away from home than at home. The beneficial effects of change of surroundings, freedom from care and worry, association with optimistic people, a suitable climate, etc., were well recognized. Answering Dr. Morris, he said that the method referred to was impracticable in the case of consumptives. The only salvation for these people was to find some physician in whom they had confidence and stick to him. Changing and moving round from place to place was fatal.

THE MEDICAL TREATMENT OF CHOLELITHIASIS.

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One need scarcely apologize for bringing before a society of this kind the treatment of a condition so common and important as cholelithiasis, considering the wide diversity of opinion which still exists among competent authorities as to the best procedure in certain phases of the disease. No one questions the wide field which surgery occupies in the treatment of cholelithiasis, nor the excellent results which in many cases can be obtained only by surgical means.

The question rather has been raised as to whether there is any efficient medical treatment for any stage of the condition, or if the diagnosis of cholelithiasis carries with it in every case the responsibility on the part of the medical attendant of advising early recourse to surgical measures. Curiously enough, physicians have been among those who have taken the most extreme position in advocating early operation. Thus Billings says, "Gall-stone disease must be recognized as a surgical disease, and, in view of the many possible consequences, the most conservative physician may well hesitate to take the responsibility of non-surgical treatment." Dieulafoy, entirely dismissing medical measures, states that "When once the diagnosis of calculous cholecystitis has been made, recourse must be had to surgical intervention."

When physicians are such strong advocates of operative procedure, one is more readily prepared for the opinion expressed by Bland-Sutton, that "The best and wisest physicians are those who point out to their patients that surgical assistance constitutes the best remedy," or that of W. J. Mayo, who says, "Whilst it cannot be denied that temporary palliation can be procured by non-operative measures, the cure of the patient can only be brought about by surgical means." Sir Berkeley Moynihan is no less emphatic: "I hold that when once a diagnosis of gall-stones has been made, operation is always indicated unless there are grave reasons forbidding resort to surgery. Reasons should not be asked for, to support a plea for operation, but in order to justify any other course. For surgical treatment—all things considered—is far safer than medical treatment: it is *curative,* not *palliative:* its results are *permanent,* and not *temporary.*" On the other hand, Kehr, a surgeon of the widest experience in this disease, with a record of nearly 2000 operative cases, and one to whom we owe much of our present knowledge of cholelithiasis, in an address before the Berliner medizinische Gesellschaft, affirmed that in at least 80 per cent. of all cases of cholelithiasis "medical measures alone will

suffice," basing his opinion not only on his own observations, but also on the results of the extensive investigations of Aschoff and Baemeister into the pathology of the disease.

When so wide a divergence of opinion exists among eminent authorities, where in the mean time may one look for the safest guidance as to the course to advise in a particular case? The position taken by Mayo Robson, that "Medical treatment must be tried fully before surgical measures are resorted to, but if after a fair trial medical means fail, surgical treatment should be adopted before serious complications supervene, and before the patient is reduced by jaundice, suppuration, or other untoward manifestations," appears, so far as one can judge from recently expressed opinions, to represent pretty accurately the views of the majority of internists in different countries, and I believe is most nearly in accordance with recent investigations and clinical experience.

It must be recognized, even by those accepting the most extreme views as to the general advisability of surgical treatment, that the latter is impossible of application in many cases owing to the patient's physical condition, and that therefore in such cases the only hope of relief is in medical measures. In this connection one need only recall advanced arteriosclerosis, cardiac disease, renal disease, and diabetes; and when one considers that cholelithiasis is especially a disease of advancing age, it is obvious that many of the cases fall into the class in which, for this reason, operation is precluded. It would, therefore, be unfortunate for us to take an unwarrantably pessimistic view of the only measures available in many cases.

It cannot be denied that during the last few years the tendency in Great Britain and America, influenced by the experience and teaching of many eminent surgeons, has been to regard all cases of cholelithiasis, with the exception of those in which some definite contraindication is present, as calling for operation. It is equally true, however, that most physicians and surgeons alike have receded from the position which formerly attached so much importance to the mere mechanical presence of gall-stones. Following the teaching of Naunyn, Kehr, Aschoff, and other German investigators, a much broader view of the whole pathological process is being taken, in which the formation of gall-stones is regarded as a mere incident of a disease in which *bile-stasis, infection,* and *more or less widespread inflammatory manifestations* are of *primary* importance, and against which treatment, whether medical or surgical, must be directed. Attention is being directed more to *biliary stasis, infection,* and *inflammatory manifestations,* rather than focused on the *secondary* result—the calculi. Kehr considers the calculi in inflammation of the biliary passages in the same light as the fecolith in appendicitis—a product of the inflammation. Since Aschoff has shown that *non-inflammatory cholesterin calculi* may occur, due to bile-stasis and certain metabolic disturbances, as in pregnancy, Naunyn's view as to the *invariable* presence of infection is no longer tenable on pathological grounds, though clinically the fact remains that these cases are unimportant so long as no infection occurs.

All these authorities believe that medical measures may be effective in relieving the inflammatory trouble in many instances, and in producing a virtual cure. Physicians have long since abandoned the attempt to dissolve gall-stones as a primary object of treatment, and surgeons are realizing that the mere removal of gall-stones by operation does not constitute a cure. The idea of *stasis, infection,* and *inflammation* is dominating therapeutic aims. This being the case, medical and surgical treatments are no longer opposed, but rather complementary to one another. In cases where good drainage can be secured, so that stasis, inflammation, and infection are relieved without operation, and the patient remains free from symptoms, this is accepted as evidence of the absence of serious local irritation by the gall-stones. If by reason of the mechanical effects of the gall-stones, or for other cause, the symptoms of infection do not subside, then operation is indicated for its relief. Kehr's statistics show that the results of operation at this time are almost as good as in early operation.

The belief that gall-stones might be dissolved was long held by many physicians. Naunyn thought this might occur in rare instances. This view has been largely discarded, but some recent investigations by Hansemann have reopened the question. He has apparently proved by experiments *in vitro,* and by transferring gall-stones from human beings to dogs, that gall-stones are soluble in normal bile, particularly stones composed largely of cholesterin. He believes, therefore, that if by treatment the catarrhal conditions of the bile-passages can be cured, inflammatory products removed, and the bile restored to its normal condition, the stones will be dissolved spontaneously. Treatment, according to him, should be undertaken with this aim in view, rather than with a view to direct action on the gall-stones. The article is accompanied by a number of illustrations, showing sets of gall-stones in various stages of being dissolved, the research reported establishing once more that normal bile under normal conditions does not permit concrements to develop, and will dissolve in time those already formed. The peculiar shape of the gall-stones found at operation in many cases is due to their being partly dissolved. Hansemann's work, if confirmed, will obviously have an important bearing on treatment.

The quiescence or latency of gall-stones in any case is now denied by some advocates of early operation, who believe that, if *clinically* quiescent, gall-stones are *pathologically* active. Convincing data, however, have not been brought forward to establish their views, which seem based largely upon personal opinion. Apart from the question whether gall-stones may or may not be dissolved, so long as the teaching, based on autopsy records and clinical experience, was accepted that in over 90 per cent. of all cases they remained latent, medical treatment had a safe objective point. If the infection, bile-stasis, and attendant inflammation could be removed, and the stones remained merely as innocuous occupants of the gall-bladder, then a natural tendency to a *virtual* cure was indicated. If, therefore, in a given case, this latent condition could be brought about and maintained, both the physician and the patient were satisfied with the results. It must be admitted that in many cases formerly regarded as latent, fuller knowledge and improved diagnostic technique will now recognize

gall-stones as the underlying cause of digestive disturbance, flatulency, etc. We are greatly indebted to surgery for this knowledge, but it has not established the view that gall-stones are never latent.

It may appear almost presumption for a physician, with an experience necessarily limited as compared with that of many surgeons, to obtrude his observations and opinions upon the question of quiescence, but it is apparent that there is no plan of medical treatment with such claims to superiority that it will attract large numbers of patients to any individual physician or clinic, as flock to certain surgical clinics. It follows, therefore, that if experience with the largest number of cases alone is to be the criterion of authority, then the decision must be left to the surgeons. A collective investigation of the results of medical treatment in a large number of cases would be of much value, however, in arriving at a conclusion as to the permanency of relief afforded by medical treatment.

Apart from his experience with larger numbers of cases and the opportunity of seeing the pathological conditions at operation, the advantages of observation are not all on the side of the surgeon. The physician is usually able to follow his cases over a longer period, and oftener has a better opportunity to study, not only the initiation of disease, but ultimate results. The surgeon, moreover, deals with the more severe cases, those which have resisted medical treatment; in other words, the class of cases which all are agreed properly belong to the domain of surgery. His experience being with more severe, more resistant and complicated cases, he naturally takes a more serious view of the disease, and thus of the *hopelessness* of relief other than surgical. Dealing only with surgical measures, he is not in a position to estimate as fully the value of non-operative treatment as the physician who has seen even a limited number of cures without operation.

While accepting the data supplied so abundantly by the surgical clinics, one may properly question if the broad generalizations sometimes made therefrom are in accordance with established facts. The teaching of Naunyn, Kehr, Aschoff, and others, as before mentioned, that stagnation of the bile and infection are the chief underlying factors in the development of cholelithiasis, is now generally accepted. Obesity, pregnancy, ptosis of the viscera, fecal stasis, infections in the portal area, and metabolic disturbances, are well-recognized contributory causes. Gall-stones are the *results* of these factors, and not the primary cause of the disease. If the basis of rational treatment be the removal of the cause of the trouble, are we warranted in concluding that a cure has been effected when the removal of these causes is only *incidental to,* and *not the main object of treatment?* Gerster, in studying the causes of failure after operation, has recently directed the attention of his surgical colleagues to the advisability of a more careful consideration of the teaching of Naunyn.

The specter of danger from the development of serious, perhaps irremediable, complications from delayed operation is usually raised by the surgeon, his views naturally being based on the class of cases coming to him for relief. But it will scarcely be argued that his experience represents the average of those who have to deal with cases of all degrees of severity, from the mild or latent

to the most serious. In proportion to the general incidence of gall-stones in from 5 to 10 per cent. of autopsies, the occurrence of many of the most serious complications, such as cancer, gangrenous cholecystitis, gall-stone ileus, etc., is so infrequent that the danger of their development in a given case is too remote to constitute *in itself* a reason for operation as a *general procedure*. Is it correct to assume that recourse to early operation would appreciably reduce the general mortality by forestalling these rarer complications, when in the majority of all cases gall-stones are latent, or at least do not produce symptoms sufficiently definite to permit of a diagnosis, and especially when the course of the disease will give timely warning in most of the diagnosable cases and direct them to the surgeon? I believe that many clinicians will agree with Kehr, that it is fortunate that we are unable, by the X-rays or other means, to recognize the quiescent cases, if the presence of gall-stones *per se* is to be taken as an indication for their removal.

But again, it is claimed that operative cures are permanent, whereas medical cures are merely palliative. This statement is scarcely in accord with our knowledge of the pathology of the disease or our clinical experience. After operations the bile-stasis, infection and inflammatory changes must subside, and the underlying causative factors be removed, before the patient can be regarded as cured. If the gall-bladder is not removed, and if the causes underlying the original infection which produced the gall-stones remain or recur, on what grounds have we a right to claim that the stones will not form again, as in the first instance? Operative procedures have not been in vogue a sufficient length of time to determine definitely how frequently recurrences may take place, but that they do occasionally is well known. I have at present a case under observation with symptoms of recurrence six years after operation. Gerster, in a paper on "Unsuccessful Surgery in Disorders of the Bile-ducts," reports 11 per cent. of relapses in 57 operative cases, and quotes Ochsner's failures as 15 per cent. in *calculous* and 54 per cent. in *non-calculous* cases. It is therefore apparent that the claims of *certainty of cure* and *permanency of result* after operation cannot be accepted without qualification.

The danger from operation, even in the most skillful hands, is not to be overlooked. The mortality in Mayo's series of 4000 cases was 2.57 per cent., and in the cases collected by Bland-Sutton from the English hospitals in 1905, 17.7 per cent., the results varying with the conditions calling for relief and the experience and skill of the operator. Nor must we confound recoveries from operation with the cure of the patient's ills. As with medical cures, only time can show the permanency of relief. Gerster and others believe that drainage after operation is essential for the relief of the infection, and undoubtedly this is the case; but it has been found that in non-calculous cholecystitis, where the infection and its sequences alone are to be dealt with, operation frequently fails to give relief.

Viewing the brilliant results so often achieved by operation in cases where medical measures have failed to yield recovery, has tended, I believe, to make many take too pessimistic a view of non-surgical treatment. The strong opinions

expressed by Kehr, Naunyn, Aschoff, Hansemann, Bain, Solis-Cohen, and others as to the effectiveness of medical treatment are widely held by many practitioners of less experience, and these opinions cannot be dismissed too lightly. I have a considerable number of patients who have remained perfectly well, so far as all symptoms or other evidences of disease are concerned, for periods of from fifteen years down.

The non-operative treatment which has had the widest vogue and has longest held the confidence of the profession is the *Carlsbad cure* or some home modification of this treatment. This consists chiefly in the copious use of hot Carlsbad water or Carlsbad salts dissolved in hot water. The waters of Vichy, Ems, and Neuenahr have a similar action. In addition, *rectal injections of hot water* are sometimes used. The *diet* should be plain and unirritating, and the intervals between meals should not be too long. Some authorities attribute little importance to diet, but I have repeatedly seen dietetic indiscretions followed by a lighting up of acute symptoms. The administration of *bile-salts* and *salicylates* for their cholagogue effect and of *hexamethylenamine* as a biliary antiseptic is generally considered of value. A point which is too frequently overlooked after an acute attack is the necessity of *prolonged rest in bed,* not alone until all symptoms have disappeared, but until pain or tenderness on pressure has passed away and sufficient time has elapsed for the subsidence of the local inflammation of the bile-passages, re-establishment of drainage, and the disappearance of infection. This usually necessitates three or four weeks' absolute rest in bed. *Hot poultices* are of value during the acute stages. I do not believe that any case has been given the full benefit of medical treatment where complete rest has not been carried out. *Vaccines* have been suggested to assist in removal of the infection, but of these I have no personal knowledge. In the subsequent management of cases the *treatment of visceroptosis* by a suitable abdominal support, the *avoidance of fecal stasis and recurring infections* in the portal area (appendicitis) are very important. It is interesting to note that prolonged rest is an essential factor in the surgical management of the disease.

Time will not permit of my entering into a detailed discussion of the medical treatment, nor indeed is this necessary.

In conclusion, I believe that the following statements are fairly warranted by our present knowledge of the disease:—

1. While surgical intervention is frequently the best, and often the only means offering a chance of relief, its advocacy, based on certainty of cure and assurance of non-recurrence, is not borne out by results.

2. The main object of treatment is the relief of the infection and inflammatory changes, and not merely the removal of the gall-stones. So long as there is no recurrence of the inflammatory attacks, there will be no attacks of gall-stones.

3. Recovery not infrequently occurs under non-operative treatment, especially in early and mild cases, and particularly after first attacks, before serious local damage has been produced by the infection.

4. Medical treatment should be given a fair trial in all cases where the patient's physical condition does not warrant operation, and with the numerous patients who refuse operation. In many such cases complete and permanent recovery from all symptoms of the disease will result.

5. Medical treatment is indicated in many cases as a preliminary to operation, and in order to allow the acute infection to subside as far as possible.

6. Medical treatment is indicated in all cases *after operation,* to allow of complete subsidence of the infection and, if possible, to prevent reinfection and recurrence.

7. It would make for clearness of thinking and give definiteness to therapeutic aims if we adopt the suggestion of Naunyn to give up the term cholelithiasis and classify these various infections of the biliary passages as *cholangitis,* with qualifying terms such as *simple, catarrhal, suppurative, gangrenous, calculous,* etc., according to the condition present in the particular case.

Personally, I never advise strongly against operation in any case unless it is definitely contraindicated, but after explaining the possibility of failure, and that operation may eventually be required, I do not hesitate in early and mild cases, and especially after first attacks, to give medical treatment a thorough trial, and have found that in many instances excellent and permanent results are obtained.

BIBLIOGRAPHY.

1. Aschoff, L.: "Zur Cholesterinämie der Schwangeren," Wiener klin. Wochenschr., 1911, No. 16, S. 559.

2. Aschoff und Baemeister: "Die Cholelithiasis," Jena, 1909.

3. Baemeister, A.: "Die Entstehung des Gallensteinleidens," Ergeb. f. inn. Med. u. Kinderheilk., 1913, Band ii.

4. Baemeister: "Der Ausfall des Cholesterins in der Galle, und seine Bedeutung für die Pathogenese der Gallensteine," Münch. med. Wochenschr., 1908, No. 6, S. 283.

5. Bain, Wm.: Practitioner, March, 1913, xc, p. 538.

6. Bland-Sutton, J.: "Gall-stones and Diseases of the Bile-ducts," 1910.

7. Dieulafoy: "Textbook of Medicine," vol. i, p. 984.

8. Elsner, Henry: Interstate Med. Jour., vol. xx, 101.

9. Gerster, A. G.: Surg., Gynec., and Obst., 1912, xv, No. 5, p. 572.

10. Hansemann: "Die Losüngsmöglichkeit der Gallensteine," Virchow's Arch., 1913, Band 212, H. 1, S. 139-152. (Abst. Zent. f. d. gesammte inn. Med., June 2, 1913, p. 236.)

11. Kehr, Hans: "Welche Indikationen für die interne und chirurgische Therapie des Gallensteinleidens müssen wir auf Grund der Untersuchungen des Pathologen Aschoff aufstellen?" Berlin. klin. Wochenschr, 1912, No. 24, S. 1124.

12. Mayo Robson: System of Medicine (Latham and English), vol. ii, p. 687.

13. Mayer: Berl. klin. Wochenschr., 1911, No. 16, p. 707.

14. Mayer, P.: "Cholelithiasis," Lancet, 1912, vol. i.

15. Mayo, W. J.: Jour. Amer. Med. Assoc., 1911, vol. lvi.

16. Minkowski: Innere Medizin (von Mering), S. 585.

17. Moffatt, H. C.: Hare's Modern Medicine, vol. ii, p. 367.

18. Moynihan: "Gall-stones and their Surgical Treatment," 1905.

19. Moynihan: "Acute Crises in Cholelithiasis." Brit. Med. Jour., 1911, vol. i, p. 736.

20. Naunyn, B.: "A Treatise on Cholelithiasis," New Sydenham Soc. Translation, 1896.

21. Naunyn, B.: "Ueber Cholangitis," Deutsche med. Wochenschr., 1911, No. 44.
22. Neusser: Modern Clinical Medicine, p. 464.
23. Osler: Modern Medicine, vol. v, p. 826.
24. Osler: Practice of Medicine, 8th ed., p. 575.
25. Sherren, J.: Practitioner, March, 1913, xc, p. 522.
26. Stockton, C. G.: Practical Medicine (Musser and Kelly), iii, p. 526.
27. Strümpell: Textbook of Medicine, vol. i, p. 669.

DISCUSSION.

Dr. Roussel pointed out that whereas gall-stone patients were usually first seen and treated by the physician, and by him often referred to the surgeon, the surgeon but rarely after operation turned the patients over to the medical man again for subsequent treatment. This practice was very different from that obtaining abroad, especially in Germany, where it was the custom for the surgeon to turn the patient over to the physician after operation for medical treatment and care. Instances had occurred where failure to provide this care had been attended with undesirable results. Last winter he had been consulted by a man who had been operated upon two years before for gall-stones. He presented all the symptoms of the disease. Operation showed that there had been a reformation of the stones. If the man had been turned over to a physician after the operation the chances of recurrence would have been greatly lessened.

Dr. Stewart spoke of the treatment of cholelithiasis by bacterial vaccines. Whether or not the treatment was efficacious was a mooted question. He asked for information upon the subject.

Dr. Wilcox said the late Dr. Carl Beck was authority for an anecdote in regard to a distinguished German surgeon who suffered from gall-stones, and went to Carlsbad for relief. Upon being asked why he did not undergo an operation for the trouble, he drew himself up and said: "There is but one surgeon who can operate for gall-stones, and that is myself."

ORTHOTHERAPY: NORMALITY OF POSTURE AS A FACTOR IN HEALTH.

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POSTULATE.—The maintenance of typical or "orthograde" attitudes, and also the correction of abnormalities in posture, exert important effects on the human organism in and out of health. A study of the factors involved affords a solution to many problems of vital conservation and clinical medicine.

Homo sapiens, chief of the primates, might well assume for his motto, *"Per ardua ad astra."* In the process of attaining the erect attitude and reaching his present conformation he has passed through many phases of structural evolution.

Today there are—and at all times there have been—many urgent problems of morphologic adaptation and compensation. Men of the Neanderthal type constituted, in all probability, only one among many groups of highly specialized primates.

The *Pithecanthropus erectus* (a by no means impossible figure) serves as a prototype of emergence from the rabble of partly erect creatures to the fully upright man of recorded history.

The opposable thumb, with its limitless potentialities, lifted the group distinguished by increasing erectness far onward toward the commanding position of the efficient, versatile human being of today.

No great advance is ever made except by meeting and overcoming correspondingly great difficulties, perils, and limitations. Attainment of the fully erect attitude has come about through the elimination of many physical faults, weaknesses, and functional imperfections, from which, however, we, the descendants, have by no means yet been wholly emancipated.

It is the purpose of this communication to glance at the evidence as to: (1) The disadvantages still obtaining in the radical change from the primal "all-four," or quadrupedal, to the erect attitude; (2) to what extent it is advantageous to utilize primitive attitudes in conserving functional efficiency, and (3) how to determine the best means of conserving our uniquely specialized conformation, our acquired or artificial postures, while pursuing the economies of vegetative life in achieving efficiency, force, and grace in the arts, industries, plays, and other steps in environmental selection.

Man is the one animal maintaining habitually the upright attitude. This "orthograde" posture being contrary to type, some of his parts are subjected to strains, more or less constant, in the process of adjustment to such a reversal of original conformation. Many modifications of structure and

interrelationship have come about in achieving compensation and adaptation to a posture different from that of his ancestors.

Man being the only animal capable of employing to advantage radical modifications of primitive postures, the need arises constantly of assuming wide diversities of attitude for varying periods of time. Civilization, with its complex conditions, makes many demands, real or fancied, which compel wide departures from primal postures in seeking relief from strain, fatigue, or in meeting artificial exigencies. Industries compel the adoption of various attitudes, some of which are consonant with primitive postures, and hence afford temporary return to type. When variants from typical attitudes are maintained too long, there follows greater or less impairment or damage in function, structure, or both.

It may be assumed that these acquired postures, or adaptations to exigencies, should be modified in several directions. Among these modifications and their uses are:—

1. In maintaining balance, poise, and tissue-tone.

2. In developing various parts, and training them to their fullest efficiency.

3. By returning from time to time to primal attitudes,—all-four movements, ventrodecubitus, and the like,—some measure of tone is regained in structures vitiated by excessive or unnatural strains; compressions, passive or active.

The more nearly a human being adheres to the primal or typical or "orthograde" postures, the better does the organism sustain functional integrity, and the more economically are its mechanical activities performed. Posture variations are often permissible, however, and of value in many directions in achieving temporarily functional and industrial efficiency, as well as force and grace of movement. The more promptly an individual returns to the orthograde posture after a departure from it, the more are the factors of vital rhythm, ebb and flow of fluids, respiration, and oxygenation encouraged and economized.

II.

The normal or orthograde posture, as defined by Scanes-Spicer,[1] is "that in which the center of gravity is directly over the center of the base of support. A vertical plumb-line joining these two points bisects the median transverse occipitocondyloid axis, also the intercotyloid axis, passing through the center of gravity made up of the trunk and upper limbs. Man stands on one end of his longitudinal axis, with his center of gravity poised high over a small base of support.

"These two points are distanced as much as possible from each other by the fullest possible extension of the vertical axis in which the above points lie. In any movement of the body, or part of the body, there is a relative displacement of the center of gravity, which necessitates an increment of work to maintain the erect or orthograde posture."

[1] R. H. Scanes-Spicer, British Medical Journal, December 19, 1910; also, Medical Press and Circular, February 9, 1910.

Thereupon results a straight back, a raised and expanded thorax, well distanced from the pelvis, and a flat abdomen. This posture is the one for maximum respiratory efficiency.

While the key to the normal upright posture is (ontogenetically and morphologically) the position of the pelvis, practically and kinesthetically it lies in the action of the thorax.

In brief, the ideal standing position depends on the thoracic structures. How this can be reacquired when perverted, and why it should be, will be presented in detail later. Suffice it to state here that the ideal human standing position—the graceful, efficient body-poise—depends on the thoracic uplift, and that this involves a balanced, unconscious tension in the whole skeletal entity, a normal tonus in all supporting structures, bony, muscular, tendinous, and ligamentous,— a passive tension of the abdominal walls, maintaining the correlationships of the viscera, and hence also of circulatory and hydrostatic equilibrium.

III.

In the interests of best functionation, the head should be held high-poised. This is not compromised by moderate changes in its attitude, provided the base be not unduly altered, except for brief periods. Any continuous sagging of the thorax is followed by less or more compression of the contained and correlated viscera, and impairment of the vital processes is induced.

Next in importance is tonus or passive tension in the erector spinæ muscles. Should these relax, the diaphragm is lowered and its rhythmic pumping action lessened: regular suction is not maintained; tidal air is decreased; the portal venous system suffers as well as the systemic veins and lymphatics, and all hydrostatic actions are impeded.

Nutritive balance, neuronic poise, cerebral efficiency, all depend on these postural factors. Failure to keep the diaphragmatic suction-pump at work is followed immediately by less or more waterlogging of tissues, a dimming of the visceral "lamps of life," which should be kept always brightly burning. No conscious effort is needed when once normal respiratory habits are acquired. Inasmuch as every individual tends to carelessness, to omit vigilance, and hence to fall into disability, it is necessary that exogenous stimuli be applied from time to time, or the organism suffers.

The propulsive (centrifugal) action of the diaphragm is not optional, but compulsory. The integrity of the pump-like heart action is not more essential to life than the bellows-action of the diaphragm, which is the main agent in emptying the portal venous system, the systemic veins, and the lymphatics, as well as necessary for the indrawing of tidal air. The vertebro-thoracic structures, the diaphragm, and the powerful muscles of the spine constitute the primary mechanism of oxygenation. At the same time, these mechanical agents, acting with the abdominal muscles, exert a constant elastic pull which maintains the viscera and hydrostatic mechanisms in their normal interrelationships and aids in their action, included in which is the promotion of the ebb and flow of fluids. The downward movement of the diaphragm

(centripetal action) must be followed promptly by an uppull, or all the tides of the body rest. Any prolongation of the rest-period invites stagnation and waterlogging of tissues. Hence it is plain that thoracic competence and full action of the thorax and diaphragm are essential to the maintenance of vital processes.

IV.

The body is frequently compared to a machine of exceptional delicacy and efficiency. Far beyond the resources of a machine the body possesses powers for growth, development, repair, and adjustment; it is also capable of modifications in response to environment, favorable or unfavorable. The possessor is tempted to rely upon these resources and omit the exercise of that care and watchfulness which would be promptly bestowed upon an engine or a domestic animal. In consequence of this deplorable indifference to our largest asset, the body is perpetually falling into derangement and disrepair, physicians being occupied mainly in effecting repairs, and but rarely encouraged to act as conservators of health.

The first and most obvious principle in conserving the efficiency of a machine is to make sure that all parts are so adjusted as to secure nicest, most exact and economic action; next, so to direct moving forces that all parts shall be and remain in best adjustment. Then follow manifold and diverse factors concerned in achieving the best possible development of inherent capabilities.

The normal body is a marvel of compactness and economic adjustments. Structural symmetry contributes much to maintenance of efficiency, and even to the prolongation of life. As a man or woman grows old, increasing defects of bodily carriage and poise become evident and are deplorable from both esthetic and hygienic standpoints. Deformities caused by posture and costume likewise impair health in many directions. Postural peculiarities, present in every individual to varying degrees, are too often regarded as mere matters of course, as distinguishing characteristics, and dismissed as of no moment. A conspicuous stoop, a lateral twist, a sagging waist, high shoulders or hollow chest, bent knees, and like assymmetries are looked upon as merely evidences of bad taste, or as the fingermarks of fate. They are often deliberately perpetuated, even exaggerated in portraits, and too frequently imitated. A grave significance is added when it is realized that these departures from normal attitudes are in truth exaggerations of developmental faults. They induce degenerative changes in nerve-centers or conduction-paths, morbid slackness in tissues, impaired nutrition in important structures, compressions of blood-vessels and nerves, all tending to produce vitiations in vital structures.

It is generally assumed—erroneously—that such degenerative alterations merely foreshadow advancing age and are inevitable. Changes in shape and symmetry not seldom begin in early childhood and are often obvious in adolescents, or young adults, inducing in them deformities similar in kind, but less in degree, than in older folk. Nevertheless, among some fortunate persons of great age they are practically absent. These exceptional individuals are usually possessed of extraordinary vigor or stamina.

V.

The foregoing statements tend to demonstrate that this apparently insignificant matter of correct posture warrants scientific attention. It may be urged that certain individuals of advancing years, or even great age, are met, with well-marked attitude deformities, who yet enjoy excellent physical and mental health. Young folk are also occasionally met, of awkward shape and slouching carriage, who excel in some active field sports, exhibiting excellent and varied physical capabilities. These also are rare. Attitude peculiarities, again, are oftentimes merely affectations varying with fashions, and are to be explained by the tendency to follow absurd and unnatural standards.

Admitting that a goodly array of instances can be cited of young or old persons defective in features ordinarily regarded as marks of efficiency, yet capable of using their co-ordinate powers exceptionally well, these individuals would nonetheless be the better for correction of their defects. If these persons had possessed full, accurate command of their motor machinery and had been specifically trained to act in accordance with the best postural and motor standards, they would have become vastly better animals. Let us use as a familiar instance the race-horse, to show why special care and training are required to produce the best results. A thoroughbred colt, the product of generations of selective care in breeding and training to run or trot to the utmost of speed and style, yet requires months and years of laborious special exercises to reach his individual maximum.

VI.

To show why faulty postures actually do cause hurtful conditions it is necessary to recall that *the machinery of organic life is dependent for fullest efficiency upon normal relationships of component parts one to another.* Familiarity with the merest outlines of physiology will make it plain that one set of tissues should bear ontogenetic and exact relationships to others. It is difficult to realize how the human organism can continue to live and enjoy even moderate vigor if its divinely ordered mechanisms are thrown markedly out of adjustment, mechanically or chemically; even more is this true if they be structurally changed by compression. While the power of human endurance and recuperation is incalculable, nonetheless a little thing may go wrong, or a totally unforeseen exigency arise, and the breath of life departs in an instant: All the more reason why every effort should be made to give nature full opportunity to work on unhindered lines, and reach relative morphologic perfection.

VII.

Let me cite illustrative instances to show the hurtfulness of faulty posture. The attitude of children in schools is now receiving a late, but well-merited attention. Relative positions of the chair and desk, if correct, save the organs of sense, *e.g.,* the eye. If they be faulty, the eye is caused to suffer derangements or dangers, many of them irreparable. The destructive effects are due not so much to mere nearness, remoteness, or special

angle of the object seen, the character of the text, and position of the light; organic integrity is influenced even more by the cramped position of the little bodies, inducing *interferences with vascular and sympathetic nerve-structures which sustain the blood-supply to the eye as well as by long-maintained, irregular pressure on the major blood-vessels and nerves,* thus altering the special nutrition of delicate organs and interfering not only with local function, but with full development.

It should be recognized that prolonged sitting at a desk, even in the most correct postures, produces much damage in the growing structures of the thorax, in the bones and ligaments, and in the back and limbs. Following upon this occurs a series of changes in the circulatory organs, by which the brain and governing centers are injured more or less. The fact is well established that children subjected too early to school restraints and compelled to do work in advance of their years, fail to acquire so complete a mental development as those who begin their studies later, when better equipped structurally by specialization through spontaneous activities and unhindered compensation and adaptation.

Take a casual view of a group of school children who have not been taught or encouraged by good systems of free exercises, and it will be patent that already they have begun to acquire posture deformities. This is more obvious in girls than boys, because boys follow moral impulses to free activities and self-developmental measures, such as robust games.

Observe a group of adolescents,—youths at college, or girls on the verge of womanhood. The critical although unskilled eye will note many faults of poise, of gait, and incorrect positions of the head, back, or limbs. The trained eye can point out (especially if the concealing clothes are removed) many serious defects hitherto unnoted. Some of these may be modified later by improved methods of life. Lateral spinal curves often disappear under favorable conditions. Far oftener, however, they become permanent. The moderately distorting effects begun by school confinement become obvious when later emphasized by laborious occupations.

VIII.

Let us review the desirable features: A straight back is a good index of physical efficiency. By this is meant a backbone with no lateral, and little more anteroposterior curving than is normal for a child of 10 years. This observation is palpable enough and will be appreciated in certain of its applications, notably the military attitude taught (well or ill) since earliest recorded times. Other things being equal, the straight, well-set-up back is to be found chiefly in those subjected to careful training in wholesome, symmetrical activities. In proportion as individuals habitually maintain or return to correct attitudes do they retain vigor, elasticity, correct poise, and motor efficiency.

Next to straightness of the back, it is desirable to preserve elasticity and tone in trunk, muscles, and ligaments. Next in importance is the (nearly) horizontal position of the pelvis (30 degrees—Goldthwait); and

next, the proper carriage of the neck and superimposed head. The whole constitutes the normal, well-poised attitude essential to health, vigor, and full activity.

The effects produced, and maintained, by a (nearly) straight back are as follows: If the backbone is nearly vertical the ribs must become more or less horizontal; hence they open up, fan-like, and the thorax thus becomes more capacious. This can be demonstrated by anyone standing with the back to a wall and striving to obliterate the lumbar and nuchal curves, *i.e.*, to flatten the hollows in the back and neck.

IX.

Normality of posture is essential to organic competence. Erectness is a composite of vertical and horizontal lines from which divers other lines depend. While curving lines contribute to grace, they tend to impair powers of support. The weaker the person, the greater the curves exhibited. Weakness is conditional upon exaggeration of dependent lines which gives evidence of incompetence in supporting structures. These supporting structures may be at fault, both at origin and periphery. A tendon may become weak, or the muscle, or both, lose tone and relax. When a group of muscles grows weak at origin or insertion, deformities occur. If these weakened structures support organs, then will they cease to maintain normal interrelationships to other structures. The visceroptosia arise in central defects which can and should be radically corrected by enhancing the vital index through attention to all inherent fountains of force. A secondary cause is loss of integrity in those agencies exercising support supplied by external and collateral structures. Where these are voluntary muscles their vigor must be enhanced by all means, among the most definite of which is suitable use by exercise.

The key to the erect or orthograde posture, and hence to skeletal efficiency, to proper visceral interrelationships, and, thus, to an important factor in health, lies in the maintenance of a normal attitude of the thorax. This assumes the maintenance of a (relatively) straight backbone and horizontality of the ribs. When the ribs remain relatively horizontal and are easily held well up to their normal levels, there is afforded adequate support to the diaphragm, to the external and internal abdominal muscles, and to all those structures that combine to provide visceral support. There is thus effected a surprising degree of improvement in organic competence.

X.

Relief of disabilities through readjustment of skeletal structures is of recognized efficacy, though not adequately appreciated. Treatment by orthotherapy should begin by graded measures for achieving elasticity of the muscles, ligaments, and other supporting structures. These tend to lose mobility from divers causes, inducing first structure changes, and later posture deformities. Loss of tissue-elasticity bears directly upon respiratory, circulatory, and nutritive competence; also indirectly upon all grosser and

some finer functions. Organic adjustments are as necessary to competency as freedom from undue or prolonged pressure to the hollow and tubular structures.

By restitution of thoracic competence alone so much is added to well-being as to justify confidence in respiratory education.[2] This consists of graded exercises, designed to reinstate lost or impaired function in structures directly concerned in the primary acts of oxygen intake and appropriation.

In the domain of cardiopathies, especially where organic lesions are so far advanced as to become disabling, my experience has convinced me of the value of this measure. Likewise in respiropathies, except where structural disintegration has advanced too far, is the field of applicability large, in addition to whatever else science and experience have demonstrated to be of use.

XI.

Every infective process leaves a stain on cellular integrity, producing functional limitations of one sort or another which rarely, perhaps never, wholly disappear. On every occasion when an individual is damaged by disease, whether through toxic agencies arising from without or within; from errors of conduct, physical or mental; from accidents, traumata, there follows a lowering of the vital index, marked or slight, which may or may not spontaneously disappear. Among the higher duties of the medical man is not merely that of helping the patient through acute exigencies, nor even of restoring the organism to former planes of efficiency; he must supply something more, viz., he should utilize every occasion afforded to teach improved methods of conduct, so that hitherto unused resources shall be made available. The individual can and should be raised to a higher level of efficiency.

Mobilization of joints and muscles, liberation of adhesions and contractures, relaxation of overtension, removal of abnormal compressions on tubular structures,—all these are of fundamental importance, making for nutritive enhancement and limiting the formation of cadaveric, putrefactive, and other toxics. Not only this, but mobilization of the paravertebral structures (where they have become rigid) exerts a valuable effect on vasomotor competence, by permitting freer circulation in the spinal outlets.

There is no doubt in my mind that training the elasticity of the backbone does render signal service to circulatory activity. The effect is to enhance vasomotor efficiency. Indeed, we have here a branch of treatment, *kinesitherapy,* worthy of thorough clinical research. Rigidity is by no means only a phenomenon of aging structures, though it is most conspicuous in senility.

[2] As a graphic demonstration of the efficacy of this one orthotherapeutic principle, we may cite the practice of the Hindu Yogis. It is well known that this large group of people attain a highly desirable degree of vigor and resistance to disease by pursuing this one measure alone. The constant practice of the "complete breath" does, in and by itself, bring about marvels of reconstruction not only in the domain of physical, but also in that of mental, processes. The results claimed may appear excessive, even fanciful, to those unaware of the facts, yet the evidence is concrete and convincing.

Among young children it is frequently exhibited, and too often overlooked. In the whole group of contractures following spinal cord disease, cerebral palsies, and descending atrophies, there is plain evidence of rigidity, contractures, and spasticity. This feature is too frequently obscure, and is only to be revealed by careful observation and testing.

XII.

In his daily work the clinician meets constant evidence of impairment in the tonicity of muscles and of elastic and supporting structures. This is a highly significant condition and should never be neglected. Often enough it induces a secondary atony, or flaccidity, resulting in phases of invalidism manifested by mental asthenia and physical depression; especially in the circulatory, digestive and eliminatory domains, which must be reckoned with. Otherwise, it is impossible to secure full repair.

Here orthotherapy, achieving skeletal, and hence also organic, readjustments, accomplishes much more than any other remedial agency. Even as an auxiliary treatment it is unsurpassed.

Perhaps the most graphic, urgent and often puzzling disabilities due to loss of mobility have to do with sensory distresses which are then caused. It is not enough to locate the seat of pain, to determine the structures at fault, or to work out a pathologic explanation of the sensory phenomena manifested. Drugs employed to mitigate pain cannot reach the source of trouble. To achieve radical cure involves forming a broader conception of the type and degree of functional disrepair, and evaluating the kind and quality of damage in collateral or correlated organs or structures, all of which demand physiologic encouragement or compensation.

XIII.

Biologically, man's upright attitude places many of his parts at an anatomic disadvantage. Especially is this true of the abdominal organs, hollow or tubular structures containing varying amounts of burdensome fluids. These drag downward upon the relatively feeble supports. Hence it is important that they should be emptied promptly and completely, if integrity, both functional and structural, is to be insured. Loss of functional integrity may not be followed at once by noticeable disorders, but it constitutes chronic disability which bears heavily upon the patient's well-being. When this stasis in the splanchnic circulation is protracted, there follows a complex group of effects impairing the integrity of the self-regulative and protective forces, inviting damage, expediting the devastations of infectious agents, and also lowering mental and moral balance.

So long as the supporting structures maintain their tone, all goes well. If tonicity is lost, engorgement occurs, especially in the lower quadrants, and waste materials are retained which should move out freely. All this leads to supersaturation with toxic waste-products, till the resulting condition resembles that of a bit of wood long immersed in dirty water. When

tissue-tone is impaired in the relatively feeble supporting structures, the back sags and bends to compensate for the heavy down-drag, the ribs and chest fall in, the abdominal muscles are weakened and overstrained, and the hollow organs are compressed. Not only do all the viscera, solid or hollow, lose their nicety of adjustment (so essential for functional alertness), but a general hypoplasia follows.

Neglect of these acquired defects leads to disorders throughout the domains of nutrition, neuronic action, etc., the result being damaged organs, among which, notably, are those of the respiratory, genitourinary, and reproductive systems. Whenever an infective process occurs, even of mild degree, an excess of exudation takes place, followed by restricting bands of organized lymph, adhesions, and fibrosities. Splanchnic engorgement leads to vascular degeneration at the fountain-source of vital activity. Indeed, this "water-logging" of the lower abdominal organs constitutes the key to an enormous number of morbid states, and is too often not appreciated.

Relief measures are simple enough, and when regularly applied not seldom suffice to remove a number of disabilities previously puzzling and obstinate.

XIV.

Let me give a few brief hints concerning the manner in which the process of securing correct posture should be begun:—

By the simple device of clasping the hands behind, pulling apart strongly and pushing the arms forcefully down, at the same time thrusting up the chin vertically, the contractured tissues—those of the chest in particular—are forcibly stretched; perhaps for the first time in years. This act, repeated with steady increments of force, widens the front and base of the thorax, educates the downpull of the erector spinæ muscles, and overcomes the common and damaging habit of stooping. Stooping always causes undue compression of the viscera.

By this procedure I have frequently been able to rid patients of limitations caused by adherent pleuræ; to improve the power and sonorousness of the voice; to restore, in a measure, chronically impaired hearing; to relieve many of the evil effects of chronic heart disease, and to mitigate asthmatic or other morbid states. The increased respiratory capacity induced also makes for esthetic as well as essentially physical betterment. By adding to the procedure forced expiratory action, the lower ribs are made to contract powerfully, and the abdominal contents are raised toward the diaphragm, whereupon a varied train of advantageous effects ensues. In short, by a close study of the minor contractures and their economic correction, it is practicable to procure, at any age, that symmetry and elasticity of the body which constitutes the index of a high working capacity.

(A second paper will set forth illustrations of the practical value of right attitudes in aiding functional competence; also recommendations how correct posture may be achieved.)

THE TREATMENT OF SPLANCHNOPTOSIS, WITH REPORT OF CASES.

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THE essayist emphasized the point that congenital cases of splanchnoptosis should be recognized in early childhood. Exercises that would tend to increase the capacity of the abdomen and develop strong abdominal muscles might decrease the number of severe cases. Cases without adhesions, or with loose adhesions, could be relieved and made comfortable by proper medical treatment. Cases with firm adhesions which caused a definite kinking or constriction of any portion of the gastrointestinal tract, with symptoms of chronic obstruction, required surgical intervention. The medical treatment referred to had for its object the improvement of nutrition, an increase in the nervous and muscular tone, the correction of gastric disturbance, and the removal of constipation. Forced feeding, rest in bed, and the use of a suitable corset might be required. The author preferred the corset recommended by Doctor Gallant some years ago.

DISCUSSION.

Dr. A. Ernest Gallant, New York, said that he had been the first in this country to advocate scientifically constructed corsets in the mechanical treatment for visceral ptosis. He was glad that the medical profession had come to realize that but few cases call for operation. In most cases the organs could be adequately supported and the dragging downward counteracted. The corsets on the market today failed to furnish the right sort of support, being designed upon an erroneous principle. Under them all, at the bottom in front, was a space that allowed sagging of the abdominal contents. One of the chief objects of support was to do away with this. Dr. Gallant's way was to put the patient on her back, raise her hips, allow the organs to flow back, with the assistance of massage, and then to lace the corset snugly and properly so that when the patient arose there should be no opportunity for falling down of the abdominal contents. He believed that his corset met these requirements. It did not permit of any sagging, whether the patient were standing, sitting, or lying down. It put a shelf under the lower abdomen to hold the viscera up, thus doing away with the sensation of dragging that so many women experience. The cause of the sensation was the dragging of the unsupported organs upon the whole system of attachments along the spinal column, from the neck down. Proper support must and did hold up not only the abdominal viscera, but the thoracic viscera as well. If the epigastrium was hollow as compared with the protuberant hypogastrium there was sure to be displacement of one or several viscera. Each organ might not sag very much, but the downward pull of all together caused the discomfort and neurasthenic symptoms. The relief afforded by a properly adjusted corset was demonstrated by the change that came over these patients when they foolishly lay the corset aside for a time. Some of them had to go to bed while it was being repaired.

ON THE EFFECT OF SCARLET RED IN THE TREATMENT OF GASTRIC AND DUODENAL ULCER.

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THE efficacy of any drug in the treatment of a special disease is at times most difficult to estimate, especially in those instances in which the disease has a tendency to heal of its own accord. It is therefore with some hesitation that we here advocate the employment of scarlet red in the treatment of certain cases of peptic ulcer; however, if it can be demonstrated that some cases of ulcer which have resisted other means of treatment have apparently healed under the influence of this dyestuff, it is believed that there is sufficient justification for giving the remedy a distinct place in the treatment of this affection. It must, however, be distinctly noted in advance that there has been no desire on our part, in advocating the use of this drug, to displace the time-honored rest-cure treatment of Leube or the more recent cure of Lenhartz, but simply to recommend its employment as a useful adjuvant in the treatment.

We are greatly indebted to Dr. John Staige Davis, who, in his admirable work on "The Effect of Scarlet Red on Defects in the Mucous Membrane of the Stomach,"[1] first suggested the use of this drug in the treatment of ulcer of the stomach, and who proved its usefulness experimentally in animals. "It occurred to us," he says, "that possibly ulcers of the alimentary tract, especially ulcers of the stomach, might be benefited by the use of scarlet red, if it could be brought into contact with the ulcerated surface. There was no reason to believe that this dyestuff would not have a definite stimulating effect on the epithelial edges of these ulcers, as local applications of this substance to sluggish ulcers of comparable size on mucous membranes in other situations caused definite epithelial stimulation and rapid healing. All that is necessary for the healing of such an ulcer is for healthy mucous membrane to grow across its floor and remain intact, and it seemed possible that the mucous membrane of the ulcer edges might be stimulated by the scarlet red and thus accomplish the desired result. Proceeding on these premises it seemed wise to undertake some experimental work on animals before attempting to administer this substance to a patient suffering with gastric ulcer."

[1] Johns Hopkins Hospital Bulletin, Nov., 1912.

Davis calls attention to the following properties of this dyestuff: "Scientific name, Toluneazotolueneazo-betanaphthol. Commercial names, Biebrich Scarlet R. Medicinal; Oil Scarlet; Red B. Oil, Soluble Extra-concentrated; Ponceau 3 B.[2]

Method of Preparation.—It is made by a combination of amidoazotoluol and betanaphthol, and has the formula:—

$$C_6H_4(CH_3) - N=N - C_6H_3(CH_3) - N=N - C_{10}H_6OH \text{ (Beta)}.$$

Color.—It is a reddish-brown powder, which gives a scarlet-red color in oil solutions. It cakes about 175° C. and melts at 184° to 186° C., forming a dark-bronze, shiny mass. At about 260° C. decomposition takes place and heavy brown fumes are emitted.

Taste.—The powder and also the oil solution are tasteless.

Reaction.—A 1 per cent. solution in neutral oil is neutral to litmus.

Solubilities.—It is insoluble in water and urine, even after boiling. It is soluble in alcohol, ether, and chloroform, olive oil, fats, fatty oils, turpentine, warmed petrolatum, and paraffin. One gram of finely divided powder, heated gradually in 100 c.c. of olive oil to 200° C., remained in solution for two days or more at ordinary room temperature. Approximately a 2 per cent. solution can be made, but the scarlet red does not stay in solution for any length of time, and tends to precipitate at once on cooling.

A reaction which will specifically identify this dyestuff has not yet been discovered. There are, however, a number of color reactions with various acids, which we will not consider at this time.

The gastric juice, experimentally, has no effect on the scarlet red.

X-ray Findings.—This material casts no shadow on an X-ray plate.

Bactericidal Properties.—A luxuriant growth of *Bacillus coli* and also of *Staphylococcus aureus* was obtained in twenty-four hours from both agar and bouillon cultures intimately mixed with 1 per cent. oil solution of scarlet red. This seems to show that this substance has little, if any, bactericidal property."

Davis's conclusions as to the effect of this substance are as follows:—

"The dyestuff used in this series of expeirments is not toxic and apparently has no deleterious effect on either dogs or rabbits. When given by the mouth it is a fat-selecting vital stain. In the course of months the stain is gradually eliminated. Subcutaneous and intraperitoneal injections stain only the fat in actual contact with the scarlet-red oil solution. It is difficult to say from these operative experiments whether the scarlet red has, or has not, a definite stimulating action on the epithelium of defects in the gastric mucosa. However, the scarlet-red oil solution caused a more rapid and better developed growth of epithelium in the group in which it was used than occurred in the duplicate group where plain olive oil was used. The results with dry powder were not so favorable experimentally, but this may have been due to the fact that the material was not continuously in contact with the denuded area. We

[2] "Organic Coloring Matters," Schultz and Julius (Green), 1904, p. 108, No. 150.

were unable to determine the relative effect of the scarlet red on chronic gastric ulcers, as it was impossible to produce chronic ulcers in dogs with controls of exactly the same size. Our experiments are suggestive, and, as this dyestuff may be safely administered, we feel that it is worthy of a thorough clinical trial."

Scarlet red may be administered in doses of from 15 to 20 grains, three or four times daily, without producing the slightest toxic effect, provided a pure preparation be employed (Biebrich). It is best given in 7½-grain konseals, 2 of which may be taken three or four times daily before meals. It may, however, be administered in much larger doses, and only after very large continuous doses can the odor of camphor be detected in the urine. Not the slightest toxic effect of this drug could be observed in any instance, during its employment in over one hundred patients.

In this study we have selected from our records 37 cases of ulcer in which scarlet red was employed in the course of treatment. In the largest proportion of these cases a most beneficial effect seems to have been obtained from its use. We have not included in this report those cases in which the Leube or Lenhartz cure had been undertaken and which have made uneventful recoveries, inasmuch as most of such cases would have recovered without the help of any drug whatever; but have included only those in which the result of the rest cure was unsatisfactory, and have added the ambulatory cases of ulcer which remained unbenefited by the usual treatment. Of the cases in which this remedy was employed, 18 were treated by the Leube rest cure, 11 by the Lenhartz treatment, and 8 were ambulatory cases. Of those treated by the Leube cure, 14, or 37.8 per cent., were cured; 2, or 5.4 per cent., were relieved, and 2, or 5.4 per cent., were not relieved. Of those treated by the Lenhartz method 6, or 16.2 per cent., were cured; 2, or 5.4 per cent., were relieved, and 3, or 8 per cent., were not relieved. Of those given ambulatory treatment, 2, or 5.4 per cent., were cured; 3, or 8 per cent., were relieved, and 3, or 8 per cent., were not cured. When we take into consideration the fact that all of these cases resisted the usual treatment (that is, were treated by the usual methods first, and were not relieved until the scarlet red had been administered) the result is most gratifying.

Case No. 13, S. W., will illustrate this condition. The patient, a man aged 49 years, had been affected with a duodenal ulcer for a period of two years. He suffered with severe pain appearing three hours after meals; the pain was relieved by food and by alkalies. All of the other important symptoms of duodenal ulcer were present, *i.e.*, an epigastric and dorsal painful area, marked hyperacidity, and occult blood in the stools. The patient was given a thorough Lenhartz treatment, extending over five weeks; he was relieved during the course of treatment, but as soon as he was placed on solid food the pain began anew. Scarlet red was administered in 15-grain doses three times daily; the pain was relieved after a few doses, and the patient was able to be about in a few days. He continued this remedy for four weeks, and has remained well during the past six months.

Another interesting result of this treatment is illustrated by Case No. 17, P.E., who was affected with gastric ulcer for a period of eight years, with periods of relief of from three to six months. He had been suffering from the present attack for four and one-half years. He had great pain after eating, and was forced to live on liquid and

semisolid food on account of the excessive pain, nausea, and vomiting. He was unable to undertake the rest-cure treatment, and was given 15 grains of scarlet red three times daily. After three weeks he was able to partake of light solid food, and after four weeks was able to discontinue the remedy. After eight months he has had no return of his present disorder.

The results of treatment in the 37 cases in which scarlet red was utilized are illustrated in the accompanying table. In it are noted respectively, the location of the ulcer, the dose of scarlet red administered, the duration of treatment, and its effect. From the use of the remedy we believe we are justified in drawing the following conclusions:—

1. Scarlet red is a useful adjuvant in the treatment of peptic ulcer.

2. While it cannot replace the usual forms of treatment, when it is administered in conjunction with them it frequently renders the cure more effective.

3. As a help in the treatment of ambulatory cases it is of great service, and its effect seems to be even more favorable than that obtained from bismuth.

4. Its use need not in any way interfere with the administration of other remedies, such as the alkalies or belladonna, when indicated, and, in fact, the effect of the combination is at times most beneficial.

TABLE ILLUSTRATING THE EFFECT OF SCARLET RED IN THE TREATMENT OF 37 CASES OF PEPTIC ULCER.

No.	Name.	Age.	Sex.	Diagnosis.	Form of treatment.	Dosage per diem.	Duration of treatment in weeks.	Result.
1	S. J.	34	F.	Gastric	Leube	40	4	Cured.
2	R. E.	61	M.	Gastric	Lenhartz	60	5	Relieved.
3	J. S.	33	M.	Duodenal	Leube	45	3	Cured.
4	P. S.	30	M.	Duodenal	Ambulatory	45	4	Relieved.
5	S. M.	38	M.	Gastric	Leube	60	8	Cured.
6	H. C.	45	F.	Duodenal	Leube	45	7	Cured.
7	S. D.	31	M.	Duodenal	Ambulatory	50	4	Relieved.
8	J. R.	45	F.	Gastric	Ambulatory	45	3	Not relieved.
9	S. T.	33	M.	Duodenal	Lenhartz	60	4	Cured.
10	R. T.	40	M.	Gastric	Leube	45	4	Cured.
11	W. R.	42	M.	Gastric	Leube	45	5	Relieved.
12	D. J.	39	M.	Duodenal	Leube	45	6	Not relievel.
13	S. W.	49	M.	Duodenal	Lenhartz	45	4	Cured.
14	A. H.	42	F.	Duodenal	Leube	60	8	Cured.
15	P. J.	41	F.	Gastric	Leube	45	5	Cured.
16	K. D.	51	M.	Duodenal	Leube	45	6	Cured.
17	P. E.	24	M.	Gastric	Ambulatory	45	4	Cured.
18	B. S.	42	M.	Gastric	Leube	60	6	Cured.
19	A. M.	30	F.	Gastric	Lenhartz	45	3	Not relieved.
20	C. F.	37	M.	Duodenal	Ambulatory	40	4	Cured.
21	J. M.	25	F.	Duodenal	Lenhartz	60	5	Relieved.
22	L. M.	34	M.	Duodenal	Ambulatory	45	6	Not relieved.
23	D. M.	49	M.	Duodenal	Lenhartz	60	4	Cured.
24	D. R.	36	M.	Gastric	Leube	45	5	Cured.
25	S. D.	38	F.	Gastric	Leube	40	6	Not relieved.
26	R. C.	26	M.	Gastric	Lenhartz	60	4	Cured.
27	B. J.	38	M.	Gastric	Leube	45	5	Cured.
28	S. M.	65	F.	Duodenal	Lenhartz	45	6	Cured.

No.	Name.	Age.	Sex.	Diagnosis.	Form of treatment.	Dosage per diem.	Duration of treatment in weeks.	Result.
29	S. L.	42	F.	Duodenal	Lenhartz	60	4	Not relieved.
30	S. D.	45	M.	Gastric	Leube	40	5	Relieved.
31	W. P.	60	F.	Duodenal	Leube	40	8	Cured.
32	C. W.	65	M.	Gastric	Ambulatory	60	3	Not relieved.
33	S. M.	52	F.	Gastric	Ambulatory	45	4	Relieved.
34	B. H.	51	F.	Duodenal	Leube	45	5	Cured.
35	C. B.	31	M.	Duodenal	Lenhartz	45	2	Not relieved.
36	D. J.	39	M.	Duodenal	Leube	40	5	Cured.
37	P. K.	43	M.	Duodenal	Lenhartz	45	4	Cured.

DISCUSSION OF PAPER BY DRS. FRIEDENWALD AND LEITZ.*

Dr. W. Wayne Babcock, Philadelphia, referred particularly to cases with perforation. In 17 such cases that had come under his observation there had been no symptoms before perforation, excepting in 1 instance. The perforation was sudden, usually after a meal. This gave rise to the reflexion that many persons in apparently perfect health were probably going about with gastric ulcer; 16 of the patients were males. Treatment was surgical, the object being to secure drainage. No especial measures were taken to heal the ulcerated surfaces. All the patients recovered.

Dr. Robert T. Morris, New York, said that, as a rule, the less that was done for these patients in the way of a radical operation, the better. Within a year and a half in 3 cases with perforation and collapse, he had operated rapidly to secure drainage, expecting to do a complete operation later on. No second operation was required, however, as all the patients recovered without it. If he had done a complete operation in the first place all might perhaps have died.

Dr. Louis M. Gompertz, New Haven, inquired with regard to the diet employed by Dr. Friedenwald in his cases.

Dr. E. Zueblin, Baltimore, said that the paper marked a distinct advance in the treatment of gastric ulcer. Methods so far suggested had proved unreliable. The speaker mentioned a case under his own observation in which he said he would like to believe that scarlet red had been responsible for the outcome. This was a chronic case of bleeding gastric ulcer (ascertained by the finding of blood in the vomitus and feces, and by Einhorn's string test) which he had treated in December, 1912, by the application of a solution of scarlet red in olive oil and 10 per cent. alcohol, with cocaine, by means of his stomach spray tube. The subjective complaints, pains and vomiting, disappeared within a few days, and the patient did not show any more blood. Although this case constituted the only observation to which he could refer, it seemed to him that the treatment of gastric ulcer with scarlet red was indicated in chronic cases where other methods had failed. As some German experimenters, working a few years ago with this agent, had noted the production of an atypical proliferation of epithelial cells in the ears of rabbits, the question still remained open whether from the use of excessive amounts of scarlet red atypical growth of the mucosa of the stomach might not result. Dr. Friedenwald, from his own experience with it, believed scarlet red to be harmless.

Dr. A. Ernest Gallant, New York, spoke of the difficulty sometimes encountered in securing drainage. When practicable, however, the treatment mentioned by Dr. Morris was undoubtedly the safest and quickest. In 1 case he was unable to keep the patient in bed after the eighth day, and the patient was at work at the end of two weeks.

Dr. Friedenwald said that he had seen a number of cases of gastric ulcer with sudden perforation and collapse, and had reported 10 such cases last year. Those treated with scarlet red, however, were subacute cases. He made no claim that it was a specific, but it was a useful adjuvant. The patient should be given the usual treatment, and scarlet red was an additional help. Many cases of ulcer did very well with rest in bed and atropine, bismuth, or one of the other remedies commonly employed. The treatment was either medical or surgical. The patients who did not respond to medical treatment should be treated surgically.

SOME NEWER NOTES ON THE SUBJECT OF PERITONEAL ADHESIONS.

By ROBERT T. MORRIS, M.D.,
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In former years we were engaged with the subject of peritoneal adhesions only as they occurred after acute inflammatory processes, and the subject occupied very little of the literature of the profession. Peritoneal adhesions of insidious onset, without history of any acute preliminary attack, are now receiving attention on every side in the medical profession, and the subject is one of the largest in the entire field of medicine.

Under the conditions of modern civilization, with diminished efficiency of the ductless glands, various toxic processes manifest themselves in ways which are commonly thought to be purely medical, yet give us hieroglyphics within the peritoneal cavity which may be read with larger and larger meaning as we learn how to translate them.

Most of the toxins exerting an influence upon the structures within the peritoneal cavity have their origin from the colonic group of bacteria. Some of the species make their way through the walls of the bowel, causing local effects with the production of symptoms which are commonly ascribed to something else. When the endothelial structures are irritated by bacterial toxins there occurs apparently a desquamation of endothelial cells, followed by a plastic exudate and its organization in the form of various adhesions, which are found in the vicinity of the cecum, sigmoid, and duodenum particularly. To another group, which may perhaps be included among adhesions, belong instances of increased connective-tissue growth occurring at the points where the intestine is more or less fixed—in the region of the cecum and sigmoid flexure, at the hepatic and splenic flexures, and about the duodenum. Some of these structures which have received names—Lane's kink and Jackson's membrane—are being given attention by many observers, who have not as yet arrived at a conclusion regarding their nature.

It is my belief that these structures made up of hyperplastic connective tissue represent two separate and distinct features. There are first, apparently, certain peritoneal defects due to embryonic remnants — certain peritoneal folds belonging to the fetus which should have undergone absorption, and remaining as more or less definite structures. The secondary feature appears later in connection with toxic processes.

Mr. Lane believes these various structures to be evolutionary in character and not inflammatory. He believes that they are developed as a result of stress placed upon viscera in the erect position of man. My own belief is that these structures are relics, plus hyperplastic processes following toxic impression. When the various bacteria which cause irritation of endothelial structures

at the same time cause irritation of connective-tissue structures, a fibrinous exudate is deposited from time to time, and this undergoes absorption, according to the well-known nature of such deposits, near the parts of the intestinal tract where peristalsis keeps the tissues in motion. In other words, a sort of kneading process breaks up new fibrinous exudate, which is absorbed continuously.

Near the fixed parts of the bowel, however, this new fibrinous material is not broken up so readily by the kneading of peristalsis, and remains to form hyperplastic tissue which follows in general the character of the parent tissue. Thus it is for the most part loose in the so-called Jackson's membrane, and more dense in Lane's kink, at the splenic and hepatic flexures of the colon, and in the vicinity of the duodenum.

It is our experience that all of the intraperitoneal adhesions and hyperplastic connective-tissue structures have a tendency to recur after treatment by the surgeon. We are led to the conclusion that the original cause persists; and for that we are to look to the physiology of the individual and to consider the question of direct toxic injury to the protoplasm of cells. A vicious circle is present in most of these cases, which belong more particularly to the neurasthenic group of patients—to the ones with defective ductless glands.

When digestive processes and metabolic processes are incomplete, the toxins which result from bacterial activity exert an ever-increasing influence, if intestinal stasis occurs as a result of the formation of adhesions which interfere with the motility of the bowel. With lessened motility and increased stasis more toxins are formed, so that the individual becomes progressively worse, unless we inhibit the development of the colonic bacteria and make that the chief object of our treatment. The surgeon is a useful resource for the internist, but he is one resource only. The separation of adhesions and of adventitious connective-tissue structures gives temporary relief from many of the distressing features in these cases, but it becomes the function of the internist to so manage digestive processes and the general hygiene of the patient that inefficient ductless glands are assisted and carried to the highest degree of efficiency that is possible in any given case.

The idea of disposing of the colon entirely is based upon the studies of Metchnikoff, who shows that many of the toxic processes have their origin from colonic bacteria; but this is a severe operation and can be obviated, for the most part, by a short-circuiting operation which unites the rectum or the lower part of the sigmoid flexure with the ileum, near its junction with the cecum. There is a probability that this operation will be performed too frequently within the next few years, because of the character of relief that has been gained—not only relief from intestinal stasis, but from toxic processes like the rheumatisms, many of the neuralgias, neuritis, and, in fact, a list too long to be enumerated here. We should reserve the operation for those cases in which really good and proper medical resources have been applied for a sufficient length of time without giving a high degree of relief. The short-circuiting operation can be done quickly through a short incision, and in itself is hardly a severe operation, but even this resource should be

used guardedly and as a species of last resort, instead of as a preliminary resource for making quick work of elaborate troubles.

DISCUSSION.

Dr. Babcock said that the theory advanced by Dr. Morris was certainly very plausible. Personally he was unable to understand or explain the formation of these adhesions and he would appreciate any light on the subject. Sometimes he wondered whether there were not two kinds of them, one due to ordinary causes and the other to toxic causes. Dr. Morris had confined his remarks to cobweb adhesions. We were gradually getting away from the old type of post-surgical adhesions, and they were now but rarely seen. This indicated the great advance that had been made in surgical methods.

Dr. Morris agreed as to the passing of post-surgical adhesions. Less attention was now given to the toilet of the peritoneum and as a result there were fewer adhesions. In many cases harm had come from excessive zeal in this direction.

THE DANGERS AND DISADVANTAGES OF SPINAL ANESTHESIA.

By W. WAYNE BABCOCK, A.M., M.D.,

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THE innocuousness or safety of an anesthetic is a relative matter, dependent largely upon the experience and the skill of the user. As compared with other anesthetics, ether, from its nearly universal use, may be considered the standard general anesthetic. It has a mortality that has been variously estimated from 1 in 50 anesthetizations, as reported by a surgeon in central Pennsylvania, to 1 in 50,000 etherizations, as reported by the Mayo clinic. We must be guided, therefore, in estimating the mortality of anesthetics, by our personal facilities and experiences. Personally, I can report at least 8 fatalities directly or indirectly attributable to the anesthetic, in a series of about 2000 anesthetizations. With nitrous oxide-oxygen there has been 1 fatality in less than 100 administrations, for prolonged operations. For comparison, the experience of five unselected assistants or associates has been taken. These physicians, from an estimated aggregate of about 12,000 anesthetizations, report 23 deaths: 18 from ether, 2 from chloroform, 2 from ethyl chloride, and 1 from nitrous oxide-oxygen administered by an expert. The disproportionate mortality from ether is due to the fact that, in Philadelphia, ether is used much more freely than any other anesthetic. From these figures we may estimate that while ether as employed by expert anesthetists, with light degrees of anesthesia and upon selected cases, may have a very small mortality, given as it often is, by imperfectly trained resident physicians and in the exigencies of a general hospital practice, we personally find the mortality to be hardly less than 1 to 500 etherizations. This gives us a rather fair basis for comparison with spinal anesthesia. For nine years all of our operations below the diaphragm upon patients desperately ill have been done under spinal anesthesia. At least 4 of these patients had had previous attempts at etherization in other clinics, but had collapsed under the anesthetic, the operation being consequently abandoned. In upward of 5000 injections with the production of spinal anesthesia, we have had 10 deaths on the operating table and 1 death after operation; 5 of these patients were nearly moribund or were hopeless under any form of treatment, 3 very ill patients died suddenly during the evacuation of enormous empyemas, and 1 patient with advanced peritonitis from gall-bladder disease was drowned by regurgitant vomiting. The tenth patient was in bad condition from gall-bladder disease associated with a serious heart lesion. The remaining patient developed heart-failure during the removal of an enormous uterine fibroid, was revived, but died as a result of circulatory arrest about two days after the operation.

In our experience, therefore, spinal anesthesia has given a mortality slightly less than that of ether. Spinal anesthesia has proved particularly dangerous in peritonitis involving the upper abdomen, in very large empyemas, and in patients shocked or nearly moribund from disease. It should be used with care or avoided in conditions of hypotonicity of the circulatory system and in advanced thoracic disease.

As to morbidity, nausea and vomiting may occur upon the operating table, but there is no secondary nausea or vomiting from the anesthetic. Albuminuria or other evidences of renal irritation have not been observed. As compared with ether, 61 per cent. of etherized patients complained of severe postoperative backache against 16 per cent. after spinal anesthesia. The average duration of incisural pain after ether was forty-nine hours, as compared with twenty-nine hours after spinal anesthesia. Postoperative headaches occur from the injection of spinal anesthesia when imperfectly prepared solutions are employed. These headaches may be very severe. In our recent series, 21 per cent. of the patients after spinal anesthesia had headache, as contrasted with 50 per cent. after etherization; the headaches, as a rule, were more severe after the use of ether. Several years ago, 5 ocular palsies of temporary duration were observed. No ocular palsy has now occurred for several years, and it is believed to have been due to the use of imperfectly sterilized solutions. One patient had severe sciatica from the puncture of a nerve-root. No other case of organic nerve-lesion attributable to the injection has been observed. In the hysterical or neurotic, however, postoperative weakness or pain is not infrequently attributed to the injection. This constitutes a distinct objection to the use of spinal anesthesia. We have, from a technical standpoint, found that the operator may very rarely fail to enter the spinal canal. This occurred in 1 instance in a kyphotic dwarf. In from 2 to 5 per cent. of the patients, the analgesia is imperfect and the injection must be repeated or another anesthetic given.

The duration of the anesthesia rarely exceeds one and one-half hours, but the patient may often be carried for a considerable time beyond this period by the use of a small quantity of ether or narcotics. The dosage of the anesthetic should be accurate, but unfortunately different samples of the synthetic alkaloids employed show variations in strength and toxicity, and the dosage may have to be changed with each new lot of the drug. This constitutes a decided objection and an added danger. If a steel needle is employed it may be broken between the laminæ. This occurred in 1 of our patients, an incision being immediately made and the portion of the needle extracted. Spinal anesthesia is dangerous in the hands of the careless or imperfectly trained, and there is danger in shaking or moving the patient during the course of the analgesia. The position of the patient must also be continuously watched to prevent upward diffusion of the drug. Meningeal infection is possible from a careless technique. We have observed no case in our series, but in 1 instance a tuberculous meningitis developed several weeks after an operation for tuberculosis of the knee. Repeated injections of the anesthetic may be given without harm. In 1 of our patients spinal anesthesia has been induced eleven times with no

evidence of cord or root injury. Consciousness of the patient is frequently an objection to the method. This usually may be obviated by preliminary injection of narcotics beneath the skin. The consciousness of the patient is, of course, objectionable to those who fail to maintain a proper *morale* in the operating room. In general, the use of spinal anesthesia should be restricted to those who have perfected themselves in its use. Ether, despite its many drawbacks, is the safest of all known general anesthetics in unskilled hands.

DISCUSSION.

Dr. Riley said that the subject was interesting to the physician as well as to the surgeon. He especially commended the essayist for his frankness. All patients should be carefully watched, and in every case a careful physical examination should be made before the anesthetic was given. Fibroid patients in particular were poor subjects for operation. They had already lost much blood and succumbed readily to shock. They looked well, but were in reality bad risks. When pneumonia occurred it was his custom to look for a possible source of infection, and he not infrequently found that the anesthetist or an assistant had had an attack of grippe. It should not be forgotten that pneumonia and bronchitis might occur irrespective of the anesthetic. In a number of the cases reported by Dr. Babcock the ill effects might not have been primarily due to the anesthetic at all. In operations upon the lung, for instance, particularly for empyema, where the lungs were handled a great deal, death might be due to interference with the vagus.

Dr. Babcock said that the intraspinal method could be employed when other anesthetics were contraindicated. It was comparatively safe, but it should not be forgotten that untoward results might follow the use of any anesthetic. It caused a marked lowering of the pulse rate and blood-pressure. This was due to the blocking out of the vegetative nervous system, so well described by Dr. Hemmeter. The higher vagus, however, was active and sent stimuli to the stomach and intestines, and this explained the increased peristalsis and spontaneous evacuation of the bowels often noted in intraspinal anesthesia. Thus, the condition was the reverse of that obtaining in the early stages of anesthesia by other methods, and patients with low blood-pressure, and particularly those suffering from shock, were not good subjects for the intraspinal method. The cases should be selected with such considerations in mind. If, however, the patient was not in a condition of shock, the intraspinal method tended to prevent its occurrence.

PROLONGED-PRECIPITATE PARTURITION DUE TO DISENGAGEMENT OF THE DISPROPORTIONATE HEAD.

By A. ERNEST GALLANT, M.D.,

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The combination of a normal pelvic inlet with a relatively small fetal head which, failing to flex properly, fails to engage and stay in the grip of the inlet; fails to make any advance; fails to glide down the pelvic planes, and thus causes delay for many hours or days, was met with in about 65 per cent. of the author's consultation cases. The maneuvers to which one may resort in order to facilitate flexion and engagement of the head within the inlet and keep it there between the pains, that it may not recede and wabble above the brim, are: (1) External pressure on the buttocks at the fundus, exaggerating the flexion of the trunk on itself and the chin on the sternum; (2) external pressure on the occiput just above the symphysis, with the palm of the hand pressing the occiput down into the brim; (3) internal pressure on the forehead, with the fingers in the cervix, *tilting* the forehead *upward* during each pain; (4) introduction of a single blade of the forceps to the occiput and gentle traction during a pain to facilitate flexion and engagement,—best accomplished by a solid blade forceps, as the head will move more readily and the bulk of the forceps will help to fill up the relatively roomy inlet, the head engaging more firmly and advancing more surely; (5) guidance traction,—high forceps, with *loosely fitting blades, chiefly as guides* and to prevent recession, being careful not to drag too vigorously or suddenly lest a too-precipitate delivery occur and the mother suffer a torn perineum which could have been avoided; (6) judicious combination of two or more of these manipulations as the case may demand. Experience has strengthened the author's conviction that the chief danger to the child in the use of forceps lies in the *unrecognized and uncontrollable compression of the head,* caused by the pressure of the cervix, vagina, and pelvic walls on the blades. This has been largely overcome by a "safety lock," devised and described by him.

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